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### AN ESSAY ON THE CAUSES AND PREVENTION OF MATERNAL MORBIDITY AND MORTALITY.<sup>1</sup>

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#### PROLOGUE.

STATISTICS, especially those dealing with mortality, do not thrill the public imagination. At best they are impersonal, generalized and massive; they deal with numbers wherein the individual is absorbed into one dull, undifferentiated whole. The mere statement that between five and six mothers in every one thousand who are confined, die from causes directly associated with their maternal function raises no alarm nor does the knowledge that the majority of these deaths are preventable produce the slightest ripple on the placid calm of public opinion. Death when it comes to the young is always a pathetic occurrence, but a peculiar pathos attaches to the death of a young woman in childbirth. The public vision is distorted and blurred rather than indifferent or perverted; one cannot

so to speak, "see the wood for the trees." Like the surrounding landscape which is obscured by the mist in the valley, the significance of the statistical results is lost in a maze of details. Let us reach the higher levels whence we may obtain a general panoramic view of the whole field. Certain outstanding facts, like mountain tops above the mist, claim immediate attention.

Some seven hundred mothers in the hey-day of their lives die annually in the Commonwealth as the result of their carrying out the highest and most important natural function. They leave behind them nearly two thousand motherless children. Each family concerned is robbed of its most cherished guardian, the husband of his confidant and adviser, the new-born babe of its natural source of nourishment and the State of a potential source of population.

In addition to the actual deaths a far greater number of mothers suffer from invalidity and chronic ill health as the result of childbirth and it is extremely probable that this statistically unrecognized morbidity in its ultimate results is much more disastrous than the ascertained mortality.

The causes of these tragedies are many and varied. They constitute difficult and urgent prob-

<sup>1</sup> Being the essay for which the Prize of the Melbourne Permanent Committee for Post-Graduate Work was awarded.

lems which call aloud for solution and which cannot for long be put aside. They demand analysis and constructive thought. They concern many aspects of our social life and rank in importance with the first social issues of our time.

#### STATISTICAL RETURNS.

##### The Problem Stated.

The experience of the last half century has brought about an improvement in obstetric technique not only in regard to the ideal of asepsis, but also in so far as the indications for and the limitations of the various operative procedures are concerned. These indications and limitations have slowly crystallized out of the excesses of enthusiasm which usually accompany any new method, whether the latter be the exhibition of a drug or a manipulative procedure, into consolidated precepts. Further, during the last quarter of a century the importance of antenatal examination and supervision of pregnant women has been progressively more and more recognized.

One would naturally anticipate that these improved conceptions would by now show some definite and beneficial results in a reduced maternal mortality.

Not only is there no evident reduction during recent years nor even a retention of the *status quo*, but instead we are faced with a definite tendency towards increased maternal mortality.

It may savour of platitude to state that "the advance of civilization does not tend to decrease the perils incidental to the physiological function of childbirth."<sup>(1)</sup> There is little doubt, however, that maternal mortality has not been affected by those numerous measures in the fields of general sanitation and hygiene which have produced such outstanding results, evidenced by a progressively declining general death rate and an advancing

expectation of life. In addition to the disturbing maternal mortality figure of nearly six per one thousand births (Commonwealth) it appears certain that large numbers of women are injured at the time of childbirth and that this injury, however slight it may appear at the time, leads to much suffering and economic distress, none the less real because in many families it may never be traced to its actual source. Some of the causative factors involved in the problem are mentioned in the various sections of this essay, but it may be stated at the outset that no particular factor nor yet any group of factors can be singled out as being wholly responsible.

Certain factors are naturally more important than others; but all are closely related and interdependent, involving not only the medical and nursing (midwifery) professions, but also the general public and the relation through social and economic avenues of each to the other.

The following table (Table I.) shows in a general way the position of the maternal mortality rate in relation to other rates.

It will be seen from a comparison of the period 1908 to 1915 with that of 1916 to 1923 that while there has been a considerable reduction of the infant mortality rate and a less marked though definite (especially when allowance is made for the influenza pandemic of 1918-1919) reduction in the general death rate, there has been an increase in the maternal mortality rate from all puerperal causes. This latter increase is all the more disquieting because up to 1915 there was a definite downward tendency in the maternal mortality rate, but from that year onwards there has been an upward tendency and in no succeeding year has the rate been as low as in 1915. The slight decrease in the rates from puerperal sepsis is more than counterbalanced by the increase in the rates from all other causes of maternal mortality.

TABLE I.—COMMONWEALTH.

Year.	Birth Rate.	Death Rate. <sup>1</sup>	Infant Mortality Rate. <sup>2</sup>	Maternal Mortality Rate. <sup>3</sup>		
				Sepsis.	Other Causes.	Total.
1908 .. ..	26.35	10.97	77.78	1.80	3.62	5.42
1909 .. ..	26.40	10.22	71.56	1.76	3.29	5.05
1910 .. ..	26.40	10.30	74.81	1.86	3.19	5.05
1911 .. ..	27.21	10.66	68.49	1.71	3.32	5.03
1912 .. ..	28.65	11.23	71.74	1.73	3.10	4.83
1913 .. ..	28.25	10.78	72.21	1.73	3.15	4.88
1914 .. ..	28.05	10.51	71.47	1.55	3.04	4.59
1915 .. ..	27.25	10.66	67.52	1.34	2.18	3.52
1916 .. ..	26.78	11.04	70.33	2.14	3.13	5.27
1917 .. ..	26.51	9.80	55.91	1.92	3.70	5.62
1918 .. ..	25.25	10.09	58.57	1.45	3.25	4.70
1919 .. ..	23.78	12.82	69.21	1.35	3.30	4.65
1920 .. ..	25.74	10.62	69.14	1.83	3.17	5.00
1921 .. ..	24.95	9.91	65.73	1.52	3.19	4.71
1922 .. ..	24.69	9.21	52.74	1.42	3.09	4.51
1923 .. ..	23.77	9.89	60.52	1.72	3.31	5.03
		- 2.2%	- 12.7%	- 0.6%	+ 4.8%	+ 2.9%

<sup>1</sup>Number of deaths per 1,000 of mean population.

<sup>2</sup>Number of deaths under one year per 1,000 registered births.

<sup>3</sup>Number of deaths per 1,000 registered births.

Before proceeding to a detailed consideration of the various statistics it is necessary to point out certain of their limitations which are unavoidable.

In order to obtain statistics compiled on a uniform basis I have utilized for the most part those furnished by the Commonwealth Statistician in each "Annual Summary of Australian Population and Vital Statistics (Australian Demography)." Unfortunately these publications are unobtainable prior to 1907 and if statistics be required for each State or for the Commonwealth prior to this year they can be obtained only from the reports of the Government Statistician of the State concerned. Here again the statistics from the various States are not strictly comparable, nor for that matter do those supplied by the Commonwealth Statistician coincide with those supplied by the States.

The difference in method of compilation is, so far as this essay is concerned, immaterial since whatever absolute or inherent defect the statistics *per se* may have, they are nevertheless comparable; this means that if one State be compared with another or with the Commonwealth as a whole, the statistics utilized will have been derived from one source common to all and compiled on the same basis.

For purposes of analysis the classification of puerperal deaths adopted for statistical purposes is not as valuable as is desirable. It is extremely difficult if not impossible to differentiate such factors as intercurrent diseases complicating gestation from, say, hæmorrhages of gestation such as abortion, ectopic gestation, *placenta prævia* and the like. There is nothing to show in the statistics whether these intercurrent diseases are eliminated from consideration in the question of pregnancy or, if so, the basis of such elimination.

Further, there is little doubt that sepsis frequently follows abortion, but the statistics do not enable one to form a judgement concerning the prevalence of sepsis following abortion compared with that following parturition at full term. This could be obviated by having a death certificate which would embrace full particulars regarding the cause of death and the statistics shown in detail. From inquiries made there is reason to believe that the figures given by the Commonwealth Statistician for at least one State and probably for others underestimate the actual position so far as maternal mortality is concerned. This means that in the subsequent analysis of the figures which are avail-

able, the true position will be presented in a somewhat more favourable light than would otherwise be the case.

#### Analysis of Statistics.

If we take the year 1923 as representative of what may be termed a normal year, in which the statistics are not liable to marked vitiation by epidemic diseases or other unusual factors, we see that 5,839 women between the ages of fifteen and forty-nine years died during the year. Of this number 3,861 women were married.

The total deaths within this age group from certain causes which are regarded as of outstanding importance in mortality returns, are set out in the following table (Table II.). For purposes of comparison the total deaths from all causes connected with the puerperal state are included, but it should be borne in mind that these deaths should be considered chiefly in relation to the deaths of married women, since the great proportion of mothers dying from puerperal causes are married.

This table shows that tuberculosis and cancer, regarded even by the lay person as diseases which exact an enormous toll of human life, cause respectively about one-fifth and less than one-eleventh of the total deaths; in the case of cancer the deaths occur for the greatest part in persons of middle age or over. The deaths from this cause of persons under thirty-five years are extremely few. On the other hand the deaths of married mothers from puerperal causes approximate very closely to one-sixth of the total deaths of married women and these deaths occur chiefly amongst younger women who in the ordinary course of events would have many years of life before them.

Whilst the problems of tuberculosis and cancer have gained a large publicity and have become questions of political significance, the fact remains that age for age the causes of maternal mortality constitute a grave drain of female life little less serious than the former and considerably more serious than the latter.

Moreover, tuberculosis and cancer are morbid conditions and are therefore scarcely comparable to childbirth which is not a disease, but has been described as a physiological function and which, in consequence, would not be expected to exact a large toll of life.

It is probable that the improvement reflected in the declining general death rate has affected male

TABLE II.—COMMONWEALTH.—DEATHS OF FEMALES—15 TO 49 YEARS—1923.

Marital Condition.	Deaths from All Causes.	Deaths from—				
		Tuberculosis, All Forms.	Cancer, All Forms.	Diseases of Heart and Blood Vessels (including Cerebral).	Cerebral Hemorrhage (including Embolism and Thrombosis).	Puerperal State.
Married ..	3,861	—	—	—	—	626
Single ..	1,978	—	—	—	—	55
Combined .	5,839	1,138	526	473	158	691



and female more or less equally. Tuberculosis as a cause of death has certainly shown a downward trend for a considerable number of years and although cancer is apparently becoming a more frequent cause of death, the increase may be more apparent than real owing to more accurate diagnosis and other factors.

In view of these facts as well as those shown in Table I., it is evident that the parturient mother has not shared in anything like an equal degree with the general population and especially with infants in the improvement of the public health.

This is a situation which must necessarily cause grave concern to all interested in the well-being of women. It scarcely seems necessary to enlarge upon the serious effect of a high maternal mortality rate upon the health and welfare of many hundreds of families every year. With certain exceptions the women concerned are in the prime of life and are actively engaged in fulfilling the most important duty of bearing and rearing children for the nation. Most of them might in the ordinary course of events look forward to many years of health and usefulness. The unexpected loss of the mother is a tragedy to the family. It is not infrequently associated with the death of the infant for whom the maternal life has been sacrificed and is often followed by the impaired health and nutrition of the remaining children. Further, the fact that the mortality returns reveal only a part of the total damage and disability and that an incalculable amount of unreported and often untreated injury and ill-health result from pregnancy and labour, has many times been pointed out. It is this burden of avoidable suffering which we seek to relieve scarcely less than to save lives which need not be lost.<sup>(2)</sup>

It is desirable at this point to inquire somewhat more closely into the significance of the decline of infantile deaths. Has the saving of infant life been uniform throughout the first twelve months of life? If so, the increasing mortality among mothers has not influenced the children and infant mortality must have little or no connexion with

the influences affecting the mother. If not, we must inquire at which period the decline is not uniform and trace, if possible, the relationship between such period and the concomitant maternal mortality.

Such relationship, if established, may throw light on the factors acting detrimentally on the mother, since it is probable that a maternal influence prejudicial to the child may not leave the mother unscathed.

On this assumption one might readily anticipate that some relationship would be shown between maternal mortality and stillbirths. By the same reasoning we might expect to find evidence of a somewhat allied relationship between maternal mortality and the infantile mortality of the first week of life. Statistics relating to stillbirths are, however, not reliable and no good purpose would be served by using those which are available.<sup>1</sup>

Statistics regarding infantile deaths within the first month are however available and are presented in Table III.

It will be seen from Table III. that the general reduction in infantile deaths has at least not affected the mortality of the first week of life. This mortality has not only remained practically unaffected so far as improvement is concerned for perhaps the last half century, but also shows during the period 1908 to 1923 a definite increase. This increase is the more significant when compared with the marked decrease during the same period in the mortality of infants over one week but under one month.

<sup>1</sup>The only statistics available are those derived from the notification of stillbirths by midwives in those States possessing a *Midwives Act*. These statistics are not reliable and only represent a fraction of the total. It is a pity that the evidence regarding stillbirths available in consequence of maternity bonus claims, has not been tabulated.

TABLE III.—COMMONWEALTH.—DEATHS OF INFANTS UNDER ONE WEEK AND UNDER ONE MONTH.

Year.	Deaths under One Week.		Deaths over One Week but under One Month.		Total Deaths under One Month.	Maternal Mortality Rate. <sup>2</sup>
	Total Deaths.	Infantile Mortality Rate. <sup>1</sup>	Total Deaths.	Infantile Mortality Rate. <sup>1</sup>		
1908 .. ..	2,333	20.91	1,136	10.18	3,469	5.42
1909 .. ..	2,325	20.38	1,085	9.51	3,410	5.05
1910 .. ..	2,421	20.72	1,124	9.62	3,545	5.05
1911 .. ..	2,566	20.99	1,229	10.05	3,795	5.03
1912 .. ..	2,816	21.15	1,305	9.80	4,121	4.83
1913 .. ..	2,988	21.69	1,315	9.69	4,303	4.88
1914 .. ..	3,130	22.68	1,325	9.92	4,455	4.59
1915 .. ..	3,227	23.92	1,138	8.43	4,365	3.52
1916 .. ..	2,944	22.40	1,220	9.28	4,164	5.27
1917 .. ..	2,825	21.73	999	7.68	3,824	5.62
1918 .. ..	2,944	23.41	1,027	8.16	3,971	4.70
1919 .. ..	3,051	24.94	1,129	9.23	4,170	4.65
1920 .. ..	3,153	23.11	1,198	8.78	4,351	5.00
1921 .. ..	3,127	22.95	1,116	8.19	4,243	4.71
1922 .. ..	2,961	21.53	954	7.22	3,955	4.51
1923 .. ..	3,087	22.08	1,060	7.83	4,147	5.03

<sup>1</sup> Number of infantile deaths per 1,000 registered births. <sup>2</sup> Number of maternal deaths per 1,000 registered births. The increase for the mortality rate of infants under one week from 1908-1915 to 1916-1923 was 5.39%, the decrease in the mortality rate of infants under one month was 13.6% and the increase of the mortality rate of mothers was 2.9%.



Is there any relationship between this increased mortality of the first week of life and the increased mortality of the mothers? It may be more apparent than real, but from the evidence available there is reasonable justification for the conclusion that there is such a relationship and that the factors tending to produce death of the new born infant also leave in their wake at least some maternal mortality and probably a much greater maternal morbidity.

Can we go further and estimate how much of this first month mortality may be taken as an index of the efficiency of midwifery service? Can we, with any justification, adopt as a working hypothesis, an assumption verified by experience, that maternal mortality and infantile mortality of the first month vary directly with the efficiency of the antenatal and natal midwifery service available? I think we can, but the facts for this conclusion will be more conveniently dealt with in another section and meanwhile consideration of the matter may be postponed.

During the period 1908 to 1923 to which attention has been mainly directed, there has been no marked change in the social or other characteristics of the people of Australia which would in itself account for the increased maternal mortality. Even during the war economic conditions were not accompanied by any unusual distress and taking the period as a whole it may be regarded as giving evidence of prosperity. The birth rate has certainly been steadily falling during this period—from 26.35‰ in 1908 to 23.77‰ in 1923. This may result in an increased proportion of *primiparæ* among the total number of mothers. In this case it could be argued that an increased maternal mortality is to be expected when the proportion of *primiparæ* to the total number of parturient women increases. Considering the slight difference between the maternal mortality in first and other births, the increase in the proportion of the former is not sufficient to affect materially the total rate. This contention would receive support from purely clinical considerations, so that it would appear necessary to make some allowance for this factor in estimating any apparent increase in the incidence of maternal mortality.

Statistics show that the proportion of *primiparæ* in the Commonwealth has increased, but the increase is by no means marked. In 1912 the proportion of *primiparæ* was 279‰; in 1923 it was 290‰. In a period, therefore, of twelve years the average annual increase of *primiparous* births is less than one in every thousand.

Though I am not sufficiently conversant with statistical calculations to make any dogmatic assertion regarding the probable result, it seems to me on general grounds that the ascertained increase in the proportion of *primiparous* births is not sufficient to account in any essential degree for the increased maternal mortality. Considering the slight difference between the maternal mortality in first births and other births, the increase in the proportion of the former is not sufficient to affect materially the other rate.

#### Comparison of Australian Statistics with Those of Other Countries.

With one of the lowest general death rates in the world and with an infantile mortality which compares very favourably with almost any country, one would anticipate that Australia would show up well in an international comparison of maternal mortality rates. The only international statistics available to me are those embodied in Table IV, which have been obtained from "Maternal Mortality," by Janet M. Campbell, Ministry of Health Report No. 25, 1924, and to which I have added the Australian rates for the corresponding period.

It is admittedly dangerous to make deductions from statistics which are not strictly comparable, and it is probable that an intimate knowledge of the countries concerned would gravely alter one's judgement. Although the main factors concerned in the causation of maternal mortality will, no doubt, be common to all the countries in question, the incidental and qualifying circumstances may entirely prevent any scientific conclusions being arrived at.

Dr. Campbell points out many of these pitfalls and it is advisable to state in her own words the precautions to be taken in reading Table IV.

In some countries, e.g., France, Holland and Spain, the annual statistics of live births exclude not only births of infants who never had separate existence—stillbirths in the ordinary sense of the word—but also the births of children who, although born alive, did not survive beyond a certain number of days—in Holland and France three days, in Spain twenty-four hours—and whose births were not registered before death. Consequently, the ratio of deaths in child-birth to total live births deduced from the statistics of these countries overestimates their rates of maternal mortality in comparison with our own, because the divisor in our case includes a number of births which would be excluded from their divisors. It is also possible—in some instances even probable—that neither the record of maternal deaths nor that of births is as exhaustive as in England and Wales. This criticism, however, assuredly does not apply to Holland nor probably to Italy. . . . The following table (that is Table IV.) must be read in the light of these cautions.

It will be seen that Australia stands fourth highest of the series and compares very unfavourably.

TABLE IV.—RATES OF MATERNAL MORTALITY PER 1,000 LIVE BIRTHS FOR YEARS 1911-1913.

Country.	Maternal Mortality.
Scotland .. .. .	5.70
Spain <sup>1</sup> .. .. .	5.27
Switzerland .. .. .	5.21
Australia .. .. .	4.91
France <sup>1</sup> .. .. .	4.78
England and Wales .. .. .	3.94
Germany .. .. .	3.48
Norway .. .. .	2.90
Italy .. .. .	2.44
Sweden .. .. .	2.42
Holland <sup>1</sup> .. .. .	2.29

<sup>1</sup> In these countries the heading "stillborn" covers a certain number of births which would be registered as live-births in England and Wales, so that the rates of maternal mortality as calculated for this table are slight over-statements.

ably with countries like Italy and Holland concerning the accuracy of whose statistics there is no question. Granting that our local conditions, such as great distances and consequently difficulty in obtaining medical care and attention at the time of childbirth, may account in part for our unfavourable position; they do not account for the latter entirely. Norway and Sweden are more inaccessible countries than Australia and allowing for discrepancies such as less exhaustive statistics than our own, the disparity of the rates appears greater than can be accounted for by such a consideration.

It has been stated that "maternal mortality is highest in the United States, in Australia, in Canada and till a year or two ago in Scotland, where there are practically no midwives; it is lowest in Denmark, Italy, Germany, Russia and Holland where the midwives deliver nearly all normal cases."<sup>(3)</sup>

Whether this statement be entirely correct in so far as Australia is concerned we shall see later when dealing with the rôle of the midwife. Meanwhile we can be certain of one fact which has become plainly evident in the course of this inquiry and which is now accentuated by this brief international comparison. That fact is that our maternal mortality is excessively disproportionate to causes of death in general and that it is capable of being reduced.

#### Incidence of Maternal Mortality in the Various States.

It is necessary to consider whether the statistics for the Commonwealth as a whole can be taken as an index of the mortality of each individual State. From the following table it will be seen that maternal mortality has varied considerably in the different States and there has been no uniform increase such as one would anticipate from the figures relating to the whole Commonwealth.

In only two States (New South Wales and Tasmania) has there been a decrease in the maternal mortality rate when the two periods 1908 to 1915 and 1916 to 1923 are compared. In all the other States there has been an increase.

At first sight these rates would appear to bear some relationship to the density of population, but this relationship is more apparent than real.

Sparsity of population will in all probability mean long distances and difficulty in obtaining

medical attention and care at the time of childbirth and if this factor had any important connexion with the causation of maternal mortality in Australia, one would expect that the incidence of mortality would follow somewhat the same gradation as the density of population.

When Victoria is compared to Tasmania the improbability of any close connexion is at once seen. Victoria with a density of population more than twice that of Tasmania had a lower maternal mortality rate than Tasmania for the period 1908 to 1915, but a higher rate than Tasmania for the period 1916 to 1923. Comparing the two periods Victoria shows a slight increase, whilst Tasmania shows a definite decrease, whereas the reverse would be anticipated if the rates were principally controlled by the factor of density of population.

Nevertheless, there may be areas within a State where this factor would be a predominant feature, but this would be masked when the returns of the whole State are being considered. This could only be determined by a lengthy and intensive analysis of a large assemblage of data in a particular area or a particular State. It has been a well recognized fact in England and Wales that maternal mortality rates are high in markedly rural or sparsely populated areas, industrial districts and mining districts. Wales has always shown a higher rate than England, due to it is thought to the fact that the country is either extremely rural or highly industrial.<sup>(4)</sup>

Unfortunately statistics relating to defined areas within or subdivisions of a State are not generally tabulated in Australia. It is impossible, therefore, to obtain data for each locality in a State such as one can obtain in England and Wales for urban districts, rural districts, county boroughs and so forth.

However, the Government Statistician of New South Wales has kindly supplied me with statistics especially drawn up to discover, if possible, any relationship between maternal mortality in rural and urban centres (Table VI.).

It will be seen from Table VI. that in Sydney and suburbs throughout all periods and in all variety of cases the mortality rates are higher than the rates in either municipalities, shires, industrial areas or the State as a whole. This is apparently

TABLE V.—PROPORTION OF MATERNAL DEATHS FROM ALL PUERPERAL CAUSES PER 1,000 REGISTERED BIRTHS—ALL STATES AND COMMONWEALTH.

State.	Maternal Death Rates.			Density of Population—Persons per Square Mile.
	1908-1915.	1916-1923.	Decrease or Increase.	
New South Wales .. .. .	5.18	5.12	—1.1%	6.75
Victoria .. .. .	4.46	4.47	+0.2%	17.36
Queensland .. .. .	5.19	5.38	+3.6%	1.12
South Australia .. .. .	4.85	4.99	+2.8%	1.29
Western Australia .. .. .	4.57	4.77	+4.3%	0.34
Tasmania .. .. .	4.58	4.38	—4.3%	8.13
Commonwealth .. .. .	4.79	4.93	+2.9%	1.82

TABLE VI.—PUERPERAL MORTALITY IN NEW SOUTH WALES, ARRANGED ACCORDING TO VARIOUS DISTRICTS.

Period.	Division.	Deaths per 1,000 Births.					
		Puerperal Septicæmia.		Other Puerperal Causes.		All Puerperal Causes.	
		Married.	Single.	Married.	Single.	Married.	Single.
1915-1919 ..	Sydney and suburbs	2.17	4.40	3.71	6.25	5.88	10.65
	Country municipalities	1.81	2.80	3.88	5.85	5.69	8.65
	Country shires	1.10	2.08	2.67	6.75	3.77	8.83
	Whole State	1.79	3.57	3.55	6.20	5.34	9.77
	Industrial	2.14	4.46	3.76	6.19	5.90	10.65
1920-1924 ..	Non-industrial	1.46	2.07	3.35	6.22	4.81	8.29
	Sydney and suburbs	1.90	2.30	4.13	10.28	6.03	12.58
	Country municipalities	1.67	1.74	3.63	4.96	5.30	6.70
	Country shires	0.80	0.54	2.52	2.69	3.32	3.13
	Whole State	1.58	1.88	3.60	7.60	5.18	9.48
1915-1924 ..	Industrial	1.91	2.11	4.01	9.51	5.92	11.62
	Non-industrial	1.24	1.47	3.18	4.19	4.42	5.66
	Sydney and suburbs	2.03	3.32	3.93	8.31	5.96	11.63
	Country municipalities	1.74	2.26	3.75	5.40	5.49	7.66
	Country shires	0.95	1.32	2.60	4.76	3.55	6.08
	Whole State	1.68	2.71	3.57	6.91	5.25	9.62
	Industrial	2.02	3.26	3.89	7.90	5.91	11.16
	Non-industrial	1.35	1.77	3.26	5.21	4.61	6.98

"Industrial" includes Sydney and suburbs together with the municipalities of Auburn, Granville, Newcastle and suburbs, Greta, Wollongong, Lithgow, Broken Hill and Cobarr and Cessnock Shire.

"Municipalities" embrace towns, whilst "Shires" embrace rural areas.

quite the reverse of the ascertained position in England and Wales. With the facilities for maternity care, the available medical skill and the ample hospital accommodation in Sydney one would anticipate that the rates would reflect advantageously on the large centre of population in any comparison with other centres less favourably situated. The further fact that Sydney and suburbs have a higher rate than all industrial areas together cannot be too readily explained. Certain factors, absent in other centres, must be operating to the detriment of the Sydney mothers and are not controlled by the extra facilities for care and treatment available in the city.

Comparing the period 1915 to 1919 with the period 1920 to 1924 it will be seen that although in municipalities, shires and non-industrial areas the death rates from all puerperal causes have decreased, those of Sydney and suburbs and also of industrial areas have increased. This increase is connected apparently with causes other than puerperal septicæmia which has definitely decreased during the period under review.

The elucidation of this problem would necessitate very exhaustive analysis of statistics together with intensive investigation in the areas concerned and for the present one is not justified in promulgating hypotheses as deductions.

However, it appears that so far as New South Wales is concerned the parturient woman is most safe when furthest removed from centres of population in spite of the better equipment and opportunity for skilled care and treatment found in the latter.

The deplorable position of the unmarried mother is shown clearly in this table when comparison is made between the rates for married and single women.

#### CAUSES OF MATERNAL MORTALITY.

##### General Considerations.

There are certain factors which do not find a place in the nomenclature of the causes of maternal deaths, but which, nevertheless, may under certain circumstances play a very important part by acting as adjuvants to the certified cause or causes, whatever the latter may be. If it were possible to show in statistics the majority of the causes which have operated in the various individual deaths, there is little doubt that they would be not only numerous, but extremely varied. On general grounds it is recognized that the action of these factors will be common to many if not most districts or States and it is advisable to discuss their relationship to maternal mortality before proceeding to a consideration of those immediate factors which are prominently brought before us in vital statistics as the actual causes of maternal mortality.

##### *The Character of the Care and Attention Bestowed on the Mother.*

Parturition among the women of primitive races is said to be a purely physiological process which produces comparatively little inconvenience in their daily lives. The obstetric needs of the civilized woman on the other hand appear to increase in direct proportion to her mental development above the primitive standard. She is apparently so much more liable to pathological complications than is her primitive sister that a certain minimum of care and assistance is almost universally regarded as a *sine qua non*.

Of all conditions which are regarded as necessary or desirable for the safe conduct of labour, the personal attendance of a midwife or a medical practitioner or both is by consensus of public opinion deemed indispensable.

What public opinion has not yet demanded is that the civilized woman requires attention not only



at the actual confinement, but also some considerable time antecedent to the latter. Provided that the woman can obtain the services of a competent midwife for the actual confinement and the puerperium together with the advice and supervision of a careful practitioner during the later months of pregnancy and in any emergency during the actual labour, most other conditions may be considered as relatively unimportant.

Under these circumstances pathological danger signals will be detected during pregnancy; difficulties will be foreseen and counteracted; catastrophes will be avoided by being anticipated. The mother may face her ordeal with the full assurance that every risk has been reduced to a minimum so far as is humanly possible and she may confidently anticipate a safe and normal confinement and puerperium.

Such a picture presents perhaps the ideal. Why not? Safe midwifery implies competent doctors and midwives; in the absence of the latter the former cannot endure. There is little doubt that if Nature exacted the full penalty for every gross act of antenatal, natal and postnatal neglect or of unskilful treatment our statistics would be appalling. The fact that so many women survive against tremendous odds is a tribute to our good luck rather than to our good management.

When one has had the opportunity of investigating maternal deaths soon after the fatal issue, one cannot escape the conviction that a great many of them could have been avoided by competent attention to the patient or her conditions or both prior to labour.

Far too frequently the midwife, who is usually of the "Sarah Gamp" type, was "engaged" at a distance by letter and the first introduction to the patient is at the confinement. The home conditions may be totally unsuitable, but it is too late then to take effective action and the midwife "makes the best of a bad job."

Again, the medical practitioner is frequently called in by the midwife owing to some emergency. He knows nothing of the patient or her previous condition and is compelled to undertake complicated obstetric operations at the last minute and under the most unfavourable conditions. Is it any wonder that such cases form quite a considerable proportion of those which are subsequently complicated by puerperal infection.

I may mention in passing two fatal cases among many others which exemplify what may happen under certain circumstances.

**Midwife's Case.**—A midwife was engaged by letter some few months previous to the confinement. The patient was a parous woman in her second pregnancy and lived in an isolated country district. She did not engage a doctor as her first labour had been uneventful. The midwife arrived "in a hurry" just after the child was born. No vaginal examination previous or subsequent to the birth of child was made. The perineal pads were made from linen which had been "washed" by the patient in anticipation of her confinement. This linen had previously been used for dressing a septic wound on husband's arm. The patient developed puerperal septicæmia and died on the sixth day.

**Practitioner's Case.**—Both a doctor and a midwife had been engaged. No antenatal examination had been made. There was a face presentation and the fetus was eventually delivered after great difficulty by forceps. The home conditions were very unsatisfactory. Patient developed puerperal septicæmia.

Midwives attend entirely on their own responsibility a decreasing proportion of the total births in every State in the Commonwealth. The following table (Table VII.) has been compiled from statistics supplied by the Commissioner of Maternity Allowances and shows that the vast majority of women in labour are attended by a medical practitioner and that the proportion of the total so attended is increasing year by year. This fact alone will exonerate the midwife from any sweeping charge that she is wholly responsible for the maternal mortality of the Commonwealth, unless one has the temerity to argue that such deaths occur for the most part in the progressively decreasing total which she attends.

Even on this assumption it could be reasonably anticipated that with the gradual replacement of the midwife by the medical practitioner the maternal mortality would show indications of a decrease, but as demonstrated previously the tendency has been towards a definite increase. Further, the rates of maternal mortality for the period 1916 to 1923 or for that matter for any particular year of that period have no apparent relation to the proportion of births attended by medical practitioners.

If we compare South Australia where the vast majority of women in labour are attended by medical practitioners (in the year 1923 90% of the births were so attended), the maternal mortality rate does not compare very favourably with States showing a very much lower proportion of women attended by medical practitioners and consequently a larger proportion attended by midwives or handy women. The same may be said in regard to the increase of maternal mortality when the period 1908 to 1915 is compared with that of 1916 to 1923 (see Table V.), the rates of increase (or decrease) in the various States being apparently quite unconnected with the proportion of the total number of women attended either by the practitioner or the midwife.

It may in fairness be pointed out that the medical practitioner will be frequently called in order to overcome an obstetric emergency or complication and that the midwife does not on that account appear to be responsible for a large percentage of the difficult cases which tend to swell the statistics of mortality. Granting that this be so, it does not explain satisfactorily why there should be an increasing mortality with a larger assumption of responsibility by the medical profession. The possible contention that the increased number of women attended by the medical profession represent the majority of those presenting difficulties cannot be upheld, since this would imply that the difficult cases have increased enormously during recent years.

The general impression gained from these considerations is that the medical profession must assume a considerable amount of the responsibility

TABLE VII.—COMMONWEALTH MATERNITY BONUS.

Year.	New South Wales.			Victoria.			Queensland.			South Australia.			Western Australia.			Tasmania.			Commonwealth.		
	Patients Attended by Doctor.	Patients Attended by no Doctor.	Proportion Attended by Doctor.	Patients Attended by Doctor.	Patients Attended by no Doctor.	Proportion Attended by Doctor.	Patients Attended by Doctor.	Patients Attended by no Doctor.	Proportion Attended by Doctor.	Patients Attended by Doctor.	Patients Attended by no Doctor.	Proportion Attended by Doctor.	Patients Attended by Doctor.	Patients Attended by no Doctor.	Proportion Attended by Doctor.	Patients Attended by Doctor.	Patients Attended by no Doctor.	Proportion Attended by Doctor.			
1914	30,106	21,133	58%	26,969	9,091	74%	9,549	10,161	48%	10,214	2,529	80%	5,938	3,252	64%	3,211	2,822	53%	86,003	48,995	63%
1915	31,719	22,767	58%	27,178	9,101	74%	10,009	10,196	49%	10,077	2,493	80%	6,106	3,206	65%	3,258	2,714	54%	88,367	50,488	63%
1916	30,190	21,351	58%	23,035	11,433	66%	9,350	10,404	47%	9,400	2,300	80%	5,524	3,228	63%	3,092	2,578	54%	80,611	51,332	61%
1917	31,920	20,886	60%	26,754	7,924	77%	9,668	9,456	50%	9,618	2,123	81%	5,336	3,011	63%	3,243	2,423	57%	86,565	45,842	65%
1918	31,301	19,707	61%	25,499	6,696	79%	10,389	8,989	53%	9,485	1,856	83%	5,008	2,519	66%	3,196	2,188	59%	84,905	41,980	66%
1919	31,134	18,643	62%	25,477	6,320	80%	10,302	8,835	53%	9,342	1,812	83%	4,532	2,335	65%	3,288	1,926	63%	84,127	39,889	67%
1920	31,650	17,259	64%	25,555	7,348	77%	10,780	8,118	57%	9,719	1,745	84%	4,981	2,460	64%	3,450	2,048	62%	86,178	39,995	68%
1921	39,421	16,957	70%	31,210	5,568	84%	12,969	7,705	62%	10,636	1,588	86%	5,758	2,384	70%	4,026	1,889	68%	104,047	36,105	74%
1922	39,955	15,458	72%	31,122	5,135	85%	13,386	7,017	65%	10,757	1,404	88%	5,712	2,306	71%	4,044	1,799	67%	105,009	33,131	76%
1923	40,896	14,781	73%	31,619	4,641	87%	13,466	6,483	67%	10,732	1,142	90%	5,731	2,316	71%	4,196	1,640	71%	106,667	31,020	77%
Average puerperal mortal- ity rate, 1916 to 1923 ..			5.12%	4.47%			5.38%			4.99%			4.77%			4.38%			4.93%		

NOTE: Still-births are included in the above totals of births, no distinction being made between a still birth and a live birth for the purposes of the maternity allowance. The totals, therefore, will be seen to be in excess of the registered live births in any particular State or the Commonwealth as a whole.

for the unsatisfactory state of affairs represented by the statistics of maternal mortality and that the midwife, whatever her demerits in certain directions, is not alone culpable.

Whilst holding no brief for the untrained midwives (who form the vast majority of the midwifery nurses in Australia), it seems to me to be somewhat unfair and certainly not in accordance with the real facts to apportion them the larger share of responsibility in this matter.

The function of the midwife is to be the attendant of the woman whose pregnancy and confinement are normal. Theoretically the midwife is not a rival of the medical practitioner; in actual fact she is, nevertheless, frequently regarded as such.

So long as normal midwifery is considered a legitimate sphere of the medical practitioner and one especially which produces a sensible, if not an essential, portion of his income, this rivalry will continue.

Instead of cooperation and complementary action between the midwife and the doctor we are apt to obtain distrust if not antagonism on both sides. Instead of the doctor being regarded by the untrained midwife as a blessing and a friend, she too frequently regards him as a necessary evil.

In the practice of many midwives of the "Sarah Gamp" type it is the accepted rule, understood by both patient and nurse, that the latter receives a smaller fee in the event of the doctor having to be summoned. The inevitable result is that the doctor is certainly not called until the last moment when, perhaps, the patient is *in extremis*.

Closer cooperation between midwife and doctor is obviously all to the good and deserves every encouragement. But if the doctor is summoned mainly to secure the speedy termination of the labour for the convenience of those concerned, the practice needs discriminative vigilance. Operative intervention often entails increased risk to mother and child, especially as usually carried out in working class homes, and if the doctor is summoned to apply forceps merely because the second stage is somewhat prolonged and the patient clamours for relief, much of the advantage of employing a midwife with time to watch the case and facilitate natural delivery disappears.<sup>(3)</sup>

This is not the place to discuss the merits or demerits of the maternity bonus, but it is necessary to touch on it in order to explain other features of midwifery nursing which are of some importance.

Whatever indirect benefits the bonus may have brought about, it certainly has not been instrumental in reducing maternal mortality. Since it came into force the medical profession has undoubtedly been more adequately remunerated for its services in connexion with childbirth, but at the same time the bonus has been instrumental in perpetuating the unsatisfactory "Sarah Gamp" type of nurse who is assured thereby of a reasonable living. In addition it has brought into existence a plethora of private maternity hospitals, each scrambling after a portion of the bonus distribution.

There is a tendency also among midwives to undertake more than a reasonable number of cases at any one time. The result is that the patients

TABLE VIII.—PROPORTION OF MATERNAL DEATHS PER 1,000 BIRTHS FROM SEPTICÆMIA AND OTHER PUERPERAL CAUSES IN STATES AND COMMONWEALTH.

Year.	New South Wales.		Victoria.		Queensland.		South Australia.		Western Australia.		Tasmania.		Commonwealth.	
	Deaths from Septicæmia.	Deaths from Puerperal Causes.	Deaths from Septicæmia.	Deaths from Puerperal Causes.	Deaths from Septicæmia.	Deaths from Puerperal Causes.	Deaths from Septicæmia.	Deaths from Puerperal Causes.	Deaths from Septicæmia.	Deaths from Puerperal Causes.	Deaths from Septicæmia.	Deaths from Puerperal Causes.	Deaths from Septicæmia.	Deaths from Puerperal Causes.
1908	2.09	3.70	1.57	3.15	1.34	4.18	1.84	2.97	1.80	4.65	2.14	3.92	1.80	3.62
1909	1.96	2.95	1.45	3.26	1.99	3.66	1.88	3.67	1.31	4.74	1.64	2.54	1.76	3.29
1910	2.28	2.78	1.55	3.24	1.42	4.51	1.80	3.03	1.84	2.51	1.61	2.54	1.86	3.19
1911	1.89	3.31	1.60	2.95	1.76	4.06	1.89	3.88	1.11	2.60	0.92	3.68	1.71	3.32
1912	2.04	3.34	1.84	2.65	1.44	3.70	1.48	3.40	1.03	3.23	0.85	3.20	1.73	3.10
1913	2.20	3.45	1.58	3.14	3.04	3.84	1.48	2.40	0.97	2.69	1.36	2.56	1.73	3.15
1914	1.60	3.30	1.51	2.56	3.21	3.04	1.90	2.69	0.97	2.69	1.33	2.99	1.55	3.04
1915	1.53	3.02	1.11	2.59	1.48	3.21	2.16	3.05	0.77	2.67	1.20	3.95	1.34	2.18
1916	2.38	3.30	1.78	2.24	1.52	4.12	1.52	3.05	1.08	3.59	1.20	3.95	1.24	2.14
1917	2.24	3.96	1.63	3.20	2.11	4.75	2.69	2.95	1.98	3.39	1.42	1.77	2.14	3.13
1918	1.63	3.40	1.42	2.58	1.12	3.58	1.14	3.00	1.40	3.16	1.32	3.46	1.92	3.70
1919	1.50	3.27	1.20	2.80	1.44	4.46	1.17	3.79	1.58	3.20	0.75	1.88	1.35	3.25
1920	1.87	2.99	2.34	2.87	1.38	2.81	1.57	3.24	1.71	4.55	0.52	4.36	1.83	3.17
1921	1.53	2.72	1.71	3.37	1.92	4.08	1.92	4.17	0.64	1.18	1.74	2.95	1.52	3.31
1922	1.75	2.87	1.07	2.67	1.35	4.00	1.35	3.24	1.35	3.94	2.58	3.09	1.42	3.09
1923	1.90	3.75	1.50	2.59	1.96	4.65	1.96	2.99	1.52	2.55	1.06	1.95	1.72	3.31
	-5.1%	+1.2%	+4%	-1.7%	-2%	+5.9%	-6.6%	+8.5%	+26.6%	-3.9%	+11.6%	-11.2%	-0.6%	+4.8%
	-1.1%		+0.2%		+3.6%		+2.3%		+4.3%			-4.3%	+2.9%	

The date of the passing of the Act controlling midwives is indicated by black figures. + indicates an increase and - a decrease in the respective rates. Figures in italics represent the average rate for a particular group of years.

do not get the attention which is desirable, so that many minor complications (such as laceration) are not attended to at the proper time, partly from ignorance, hurry and lack of attention, partly from a desire to save the expense of a doctor. These tend in the future to bring about the great amount of morbidity which means in many cases years of chronic invalidism. Wherever there is a *Midwives Act* in force there should be a rule making it an offence for any midwife to have under her charge at any one time more than a specified number of patients.

The shortcomings of the midwife have been brought prominently under notice in various and numerous ways. Only too frequently has the medical profession pointed the accusing finger, quite oblivious of the fact that the midwife could with equal and justifiable scorn retort: "*Et tu quoque.*"

It is natural that the aid of that panacea for social evil, the legislative enactment, should be invoked with the full assurance of the support of the vast majority of the whole medical profession. It is not surprising to find under these circumstances that where the midwife is not controlled by the law, there is quite a definite and perhaps dogmatic conviction that she is, if not the sole cause, at least the main cause of our maternal mortality and that this *bête noir* should be rendered impotent by the necessary act of Parliament.

"The passing of a suitable *Midwives Act* must infallibly lead to a diminution of septic deaths and septic illness in childbirth and septic ill health in the after lives of mothers and children."<sup>(5)</sup>

Will the necessary *Midwives Act* really do this? It seems to me that the position is not quite so simple and cannot be solved by such *post hoc* logic.

Five States of the Commonwealth have had such legislation for some years and the remaining State (New South Wales) has just recently adopted it.<sup>1</sup> Table VIII. shows the proportion of maternal deaths per thousand births from "septicæmia" and from "other puerperal causes"

<sup>1</sup> The Nurses Registration Act, New South Wales, was passed in 1924.



from 1908 to 1923. It will be seen that Western Australia and Tasmania have had an act controlling midwives since 1911, Queensland since 1912, Victoria since 1915, South Australia since 1920.

If this control be such a safeguard, how does it happen that comparing the periods 1908 to 1915 and 1916 to 1923 the death rates from puerperal septicaemia in Western Australia, in Tasmania and to a lesser degree in Victoria all show a marked increase. Queensland certainly shows a decrease, but not nearly so marked a decrease as in New South Wales which has had no act in force during these periods, nor as in South Australia where the effects (if any) of the act cannot as yet, owing to lack of time, be reflected in statistics.

It will be seen then that the greatest improvement in the death rates from puerperal septicaemia has occurred in those States where the influence of legislation controlling midwives has been least marked or entirely absent. This fact will, however, not justify us in assuming that the legislation has proved detrimental for it is very probable that its benefits upon statistical results may be masked by other factors.

Australia does not stand alone in this experience, for almost similar results have been established in other countries.

The results in cases analysed since the *Midwives (Scotland) Act* has been in force show no significant difference in the incidence of puerperal sepsis between cases attended by midwives and cases attended by doctors.<sup>(6)</sup>

This aspect of the problem involves especially political and economic considerations. It is not so much the mere passing of an act that is to be desired, but rather the efficient enforcement of its provisions, actual and implied. Each Australian act specifies a minimum amount of training, but makes no provision regarding the facilities for such training and therefore the maintenance of the supply of competent and trained midwives is apt to be difficult. This probably accounts for the fact that unregistered midwives still exist many years after the passing of a controlling act, because the supply of trained midwives is not sufficient to meet the demand. Again, in isolated country districts the work is often not sufficiently constant to maintain a competent midwife in the district which therefore relies on the unregistered handy woman. Unfortunately the medical profession must be held partly responsible for the perpetuation of the unregistered handy woman, who though probably no more dangerous than her registered sister, postpones the advent of the trained obstetric nurse into her domain. Most of the Australian acts allow these unregistered women to act as midwife provided they do so under the supervision of a medical practitioner. Since she cannot legally take a case on her own responsibility, the medical practitioner in her district is assured of a monopoly of all midwifery cases.

Under these circumstances the presence of a trained and registered midwifery nurse, who may become a competitor for midwifery practice, is

therefore apt to be regarded askance by the medical practitioner; hence the perpetuation of "Sarah Gamp."

Each act allowed all women who were in practice as midwives at the time of passing of the act to become registered, but the mere fact of registration *per se* does not convert such women into trained and efficient midwives.

In the ordinary course of events it will require from twenty-five to forty years from the time when an act controlling midwives is passed, for the untrained (though registered) midwife to be replaced by a more competent successor. To replace the untrained woman suitable training hospitals are required, but an adequate number of these do not exist in many States and perhaps to a lesser extent in those States that have had controlling acts for some years than in those which have not.

Meanwhile the untrained but registered midwife must be tolerated, but should not unjustly have thrown upon her the responsibility for disaster which should be borne by other shoulders.

What has been done in the States to improve the technique or the knowledge of the untrained midwife since the passing of the acts? Very little, it seems to me. The midwife, if connected with a case of puerperal septicaemia, may be suspended from practice for several weeks. Her connexion with the patient may be fortuitous; the responsibility for the occurrence of sepsis may be entirely that of the medical practitioner who delivered the mother; but with a Pharisaical psychology we make amends at the expense of the midwife.

There has been very little financial expenditure in order to give practical instruction to the midwives, to supervise them in their work, to discuss with them their difficulties, to help in providing them with suitable accessories (for example, sterilized dressings) for their work. Our attitude has been more punitive than instructive, more dictatorial than encouraging. We are too apt to regard the midwife always and everywhere as the *fons et origo mali* and to join the popular cry of "*à bas!*"

From this brief survey it will be seen that many factors, economic, political, administrative, enter into the question of the type of professional attendance available to the mother at the time of childbirth.

Many of these difficulties will probably vanish with the lapse of time, but many could be overcome now by a just appreciation of the respective spheres of the midwife and the doctor, together with the necessary steps to control the former on a better basis than has been the case hitherto.

In a word, if the confinement be normal, there should be no need, provided the midwife be competent, for the attendance of a medical man; if the confinement deviates the slightest degree from normal, the responsibility of the midwife is to call the medical practitioner. It is a great pity that the maternity bonus is not payable only on the certificate of a medical practitioner to the effect that the mother received adequate antenatal treatment

during her pregnancy. This would mean that those cases showing every indication of normality would be attended by the midwife with the distinct understanding that the medical practitioner would attend the confinement if necessary or if special private arrangements were made to that effect. Some such understanding would eliminate a sense of competition between doctor and midwife; the former will have ample opportunity of controlling the situation for which he should receive adequate remuneration; the latter would have no disinclination to call in the doctor who has already assumed a certain responsibility for the case.

#### *Abortion and Miscarriage.*

The prevalence of abortion and miscarriage is extremely difficult to determine with any accuracy. Estimates are extremely unreliable since they will vary in accordance with the particular views resulting from a necessarily somewhat restricted experience in a certain class of practice. Statistics usually classify abortion or miscarriage under the generic term "abortion" in connexion with the accidents of pregnancy. No differentiation is attempted, probably owing to the inherent futility, between "abortion" self inflicted or procured and "miscarriage" which may be considered as a natural accident. Neither is it possible to distinguish the deaths from septicæmia arising subsequently to abortion or miscarriage from the deaths from septicæmia arising subsequently to parturition at full term. Nevertheless abortion and miscarriage must play an important part in the causation of maternal mortality and they constitute undoubtedly one of the most potent factors in the production of maternal morbidity.

Between 5% and 6% of the maternal deaths in the Commonwealth result from "abortion," but as previously stated one cannot say how many of these are really accidental or how many are artificially procured.

The statistics of New South Wales, which I believe are recognized as most accurate, give some very interesting information in regard to this matter.

For the two years 1922 and 1923 the total maternal deaths in the State were 562. Of this number nineteen or 3.3% resulted from "abortion," whilst sixty-five or 11.5% resulted from illegal operations. These latter deaths were recorded subsequent to investigation by a coronial or other official inquiry, so that there can be no doubt regarding their authenticity.

It appears then that intentional abortion plays a very considerable part in the production of maternal mortality at least in New South Wales and probably in the other States as well. The numbers under consideration are too small to warrant any definite conclusions, but there can be little doubt that for every death there must be many cases and that a large proportion of those who escape the supreme penalty, probably pay an enormous debt in consequent morbidity and ill health.

In addition to the actual cases of abortion, however brought about, we must take cognizance of the

fact that there must be many other pregnancies where drug taking or instrumental interference fail to secure the desired end. Not every case of attempted abortion proves successful, but the efforts made must prove detrimental to the mother's health and probably also to her child.

Some idea of the prevalence of abortion and miscarriage in the community may be obtained from Table IX.

TABLE IX.—NUMBER OF PATIENTS TREATED IN PUBLIC HOSPITALS IN NEW SOUTH WALES.

Year.	Accidents of Pregnancy.	Normal Childbirth.
1907 ..	962	1,364
1922 ..	3,108	3,133

The public hospitals in New South Wales treat almost as many patients for accidents of pregnancy as of normal birth. Most of the former are due to abortion or miscarriage and considering the increased numbers treated during recent years, it would seem that untimely termination of the natural course of pregnancy is very common.

On the other hand it may be that these cases are really not more numerous, but are more frequently treated in hospital than was formerly the custom.

That abortion and miscarriage are fruitful causes of maternal mortality and morbidity must be conceded, but in regard to the exact extent of their responsibility we have no definite Australian data.

In an inquiry into one hundred and fifty-four puerperal deaths in Aberdeen (Scotland) during the years 1917 to 1922 it was found that only 51% of the pregnancies reached the normal period of gestation.

The death rate per thousand births among mothers of stillborn children compared with that among mothers of liveborn children is twelve times as great, showing that the association of stillbirth with parturition would appear to have a definite causal relation with mortality. The same may be said for the different causes of death, the proportion of hæmorrhage being twenty-one times greater. The percentage of stillborn infants in which syphilis was detected (two hundred and thirty-five examined) was 18.6%.

#### *Venereal Disease.*

Syphilis is notoriously recognized as a cause of miscarriage, but its influence on maternal mortality is rather indirect on account of sepsis which follows miscarriage. Whatever opinion be held regarding the importance of syphilis as a factor in the causation of maternal mortality, there is almost a universal consensus of opinion that gonorrhœa seriously increases the risk of sepsis subsequent to childbirth.

That gonorrhœa is extremely prevalent in the community is a well recognized fact, but it is not so

well recognized that the treatment of this disease in women has not, in spite of antivenereal disease legislation, met with much success. Almost every treatment centre tells the same story—the difficulty of getting women to undergo treatment. The number of women treated is, so far as one can judge, only a small proportion of the number suffering.

That promiscuous sexual intercourse is rife can be shown by a consideration of the following facts relating to illegitimate births and first births after marriage.

The statistics of the Commonwealth show that extending over a period of twelve years from 1909 to 1920 the combined number of illegitimate births and births occurring under nine months after marriage comprise over 54% of the total first births.<sup>(8)</sup> In addition we must realize the amount of clandestine illicit intercourse over and above that represented by these statistics in order to appreciate the extent of this problem. There can be little doubt that this sexual promiscuity is, to a large extent, responsible for the spread of gonorrhœa and that the latter probably helps to swell the number of maternal deaths caused by puerperal septicæmia.

Gonorrhœa as a cause of morbidity in women is too well-known to require more than passing reference. The whole field of gynæcology is affected by its ramifications. Painful illness, chronic debility, pelvic complications resulting in subsequent catastrophes during pregnancy such as ectopic gestation and sterility are some of the numerous disasters which follow in the wake of this disease.

A discussion of the implications of the above mentioned facts and especially in regard to the question of control of venereal disease would be out of place in this essay, but it is essential to note that since a proportion of female sufferers do not for certain reasons assume treatment for venereal disease (*qua* venereal disease), every effort should be made to obviate the consequences of this neglect, so far as parturient women are concerned. The avenue which seems to me to offer most prospects of success, is to see that the pregnant woman is given every facility for antenatal care and that she is encouraged to take advantage of such facilities. This will afford an opportunity for timely treatment without subjecting the woman to any possible stigma which may be associated in her mind with attendance at the usual venereal disease clinic.

#### *Factors Affecting the General Constitution of Mothers.*

Whilst in older countries the effects of poverty and constitutional diseases, such as rickets, exert an influence on maternal mortality, they are comparatively of little significance in Australia. The vast majority of women in Australia are in this respect very favourably situated; for with the opportunity for robust development characteristic of this country the pelvic deformity so evident in many others is for practical considerations unimportant here.

#### *Employment of Women.*

Employment does not appear to be an important factor in the causation of maternal mortality or morbidity. Several investigations in England during the war period when great numbers of women were employed showed that employment was at least not harmful to general health.<sup>(9)</sup>

Where women continue in employment after marriage the double strain of housework and employment may reduce the powers of resistance. In Australia it is not the rule for married women to continue their employment unless the husband is unable, through illness or other cause, to maintain the home. It may be safely stated that the vast majority of Australian married women who are potential mothers, are not compelled to earn their living by their own individual efforts. Modern factories with improved hygiene, combined with the supervision and control exerted by inspection, have eliminated most of the conditions which formerly tended to undermine the health of women workers. On the whole, so far as Australia is concerned, employment of women as a cause of maternal mortality and morbidity may be safely disregarded.

#### *Insanitation.*

It would naturally be anticipated that bad housing, uncleanness and insanitary conditions would be closely connected with puerperal mortality, but curiously enough their influence is less direct than may be supposed.

Medical men have always been struck by the fact that many women delivered in the most deplorable surroundings, when newspapers have done service for sheets and the bedroom chamber for a basin, often make an uneventful recovery. In the external practice of most maternity hospitals the conditions of the patients' homes are often such as to make the advent of puerperal septicæmia almost a certainty and yet it remains conspicuously absent.

This peculiarity has been noted in most countries. "Our evidence does not show that the effect of bad housing, overcrowding and uncleanness is of much weight, statistically at least, in cases of normal delivery."<sup>(9A)</sup>

Whether it be that the women living constantly amid these unsatisfactory surroundings develop an immunity to the organisms which must be present, or whether it be that the causative organisms of puerperal septicæmia are a special variety and must be introduced from a special source, the fact remains that the maternal mortality and morbidity of normal confinements under these circumstances may compare very favourably with the average rates.

Nevertheless, it must be admitted that the risk increases proportionately to the domestic uncleanness and that although many women may run the risk successfully, they manage to do so more by their own individual resistance and not on account of any particular preventive measures taken by the attendant. If the risk be present when the labour is normal, it is certainly greatly increased when



any abnormality is present; hence it is extremely desirable that the patient should be removed to suitable surroundings, such as a hospital, when instrumental delivery or other operative procedure is necessary.

An inquiry into 1,253 cases of "puerperal fever" in Glasgow "appeared to suggest that insanitary conditions of themselves have little influence on the incidence of the disease. . . . Although the attack rate in the smaller houses does not appear to be appreciably greater, when it does occur the attack is more likely to prove fatal."<sup>(10)</sup>

The proper attitude to this aspect of the problem has been very aptly stated by Holmes. "Children that walk in calico before open fires are not always burned to death; the instances to the contrary may be worth recording; but by no means if they are to be used as arguments against woollen frocks and high fenders."<sup>(11)</sup>

#### Puerperal Septic Infection.

In each State of the Commonwealth and in every year puerperal septicæmia is recorded as being responsible for more maternal deaths than any other cause connected with the mortality of childbirth. Both directly and indirectly septic infection produces more injury than any other complication of childbearing among those mothers who have been fortunate enough to have escaped the fatal issue. It has always been and still remains the greatest scourge of the parturient woman, recognized in all ages as a terribly fatal disease.

Hippocrates described the condition as follows:

*Morbus hic lethalis, et pauca effugere possunt;  
Si mulieri pregnantis fiat in utero erisipelas,  
lethale est.*

Although its fatal tendency has always been recognized, it is a peculiar fact that its contagious character was not realized till almost the beginning of the nineteenth century.

The work of Semmelweis, of Pasteur and of Lister stand out as milestones on the road of progress directed towards the control of "puerperal fever."

In spite of the fact that the work of these individual pioneers, prompted by the epidemic ravages of puerperal fever in the lying-in hospitals of their day, has resulted in the practical elimination of puerperal septic infection from lying-in hospitals, there is no universal recognition of the implications of this fact by the medical profession as a whole. Far too frequently there is a disinclination to arrive at the inevitable logical conclusion that with rare exceptions every case of septic infection is due to some defect in the technique of the attendant or in the conditions under which the mother is attended during labour and the puerperium. It is so much more comforting to one's professional conscience, so much less injurious to one's *amour propre* to indict the patient herself with the charge of autoinfection or the attending midwife (if any) with inefficiency than to face boldly the position and admit personal responsibility even to oneself. Since the mortality from

puerperal septic infection comprises about one-third of the total deaths of mothers and since the control of this preventable mortality in the private practice of midwifery has not been commensurate with that effected in the public lying-in hospitals, it is very necessary to discuss this question in detail.

During the last quarter of a century general surgical work has made considerable progress. Operative procedures are becoming progressively more complicated and far reaching. This achievement has only been rendered possible by the success attending the efforts made in the elimination of septic complications from all branches of surgical work.

During this same period the mortality rate from sepsis in childbirth has shown no noteworthy diminution; in fact in several of the States there has been a very serious increase.

Puerperal septic infection, that is infection which is "puerperal in time, pelvic in place and infective in origin" accounts, as already stated, for more than one-third of the mortality and probably for most of the morbidity and invalidism resulting from childbirth.

When death does not follow in its wake, it is extremely liable to pave the way for purulent inflammations, premature sterility or some form of chronic invalidism accentuated by exacerbations of recurrent inflammatory conditions which periodically perpetuate the memory of the fact that the mother "has never been well since the birth of the baby."

How many cases of puerperal septic infection occur in Australia in any one year? Definite statistics are unavailable, but a fairly accurate estimate may, nevertheless, be made indirectly. Let us take 1923 for which statistics are readily obtainable.

In England and Wales the mortality from puerperal sepsis is less than in Australia; Fothergill<sup>(12)</sup> after collating the statistics of several large English maternity hospitals for several years concludes that "it appears that pelvic infection occurs in 6% to 8% of the cases delivered and that of the patients so infected 3% or 4% die. In other words out of one thousand confinements we may expect sixty or eighty infections and two or three deaths."

Eno<sup>(13)</sup> has published a careful analysis of 3,500 deliveries in the Pennsylvania College Hospital which closely compares with the statement of Fothergill.

If we adopt a very conservative estimate we may reasonably assume that under Australian conditions puerperal infection will occur in 4% of the total number of women delivered. As there were 135,222 births registered in Australia in 1923, there were 5,408 cases of puerperal septic infection. There is every probability that this estimate is much below the actual number, since if 4% of those infected terminate fatally, there would be two hundred and sixteen deaths, whereas there were actually registered in 1923 in Australia two hundred and thirty-three deaths. In addition to births there are

abortions, about one of latter to every seven of former, and infection is said to be more frequent after abortion or miscarriage than after labour at full term. On the same basis of computation we should therefore add about seven hundred and seventy-two to those suffering from ordinary puerperal septicæmia, making a total of over six thousand.

It is perhaps advisable to point out that the above estimate does not mean only those cases which would be diagnosed as "puerperal fever," but those in which infection of some appreciable degree occurs. It will be necessary to deal subsequently with the various conceptions of what constitutes puerperal infection but meanwhile it is necessary to offer this passing explanation.

#### Nature of the Infection.

There is as yet no exact knowledge regarding the *causa causans* of puerperal septic infection; no specific organism has been definitely incriminated. The organisms found vary in individual cases, the most frequent being the streptococcus, staphylococcus and *Bacillus coli communis*. The gonococcus, pneumococcus and others are detected from time to time. There is definite evidence that the streptococcus is usually associated with the more virulent types of infection and with most fatal cases. It is probable that it is not so much a question of the variety of the organism itself, but rather its virulence and the resisting power of the patient.

Virulence is variable in the same organism and may be considerably enhanced by passage through several individual hosts. It is by no means unlikely that unintentional passage of organisms may account for many sudden outbreaks, so that organisms of low virulence transferred to another individual become increasingly dangerous in consequence. It is obvious that the results will be more disastrous in a patient exhausted from hæmorrhage or from operative procedures, which generally mean injury to the maternal tissues. The frequency with which prolonged and difficult labour which has involved instrumental interference or other internal manipulations, is associated with infection, is the most outstanding fact impressed on the mind of anyone who has investigated these cases.

#### Whence Comes the Infection.

We have been apt in the past to ascribe in the incidence of puerperal infection an important part to insanitary dwellings and conditions. A somewhat similar attitude of mind was at one time common and is by no means rare even now, in regard to the spread of an infectious disease such as diphtheria. Without minimizing the benefit for certain practical purposes of such a view, experience has definitely taught us that, excluding actual septic disease in the mother prior to parturition, the one essential in the reduction if not the absolute prevention of puerperal infection is the elimination of infective organisms by strict asepsis and antisepsis on the part of the doctor or of the midwife or of both.

This is accepted almost as an axiom in medical history owing to that fact having been established in numerous maternity hospitals in many countries.

The statistics of the York Road (General Lying-in) Hospital, London, illustrate this point very well.

TABLE X.—DELIVERIES AND DEATH IN CHILDREN AT THE YORK ROAD HOSPITAL FOR THREE SUCCESSIVE PERIODS.<sup>(14)</sup>

Place.	Period.	Deliveries.	Deaths.	Death Rate (All Causes)
York Road Hospital	1833-1860	5,833	180	1 in 32
	1861-1877	3,773	64	1 in 58
	1879-1904	11,186	53	1 in 211 (1 in 302)
England and Wales	1901-1903	2,818,577	16,046	1 in 175 (1 in 226)

Omitting deaths from incidental causes not specially related to childbirth the deaths in 1879-1904 number 1 in 302 in the experience of the hospital and 1 in 226 in the experience of England and Wales in 1901-1903.

The possible sources of infection are extremely numerous and this accounts in great part for the diversity of opinion regarding its actual origin. The most common source is the introduction of the infection by the medical practitioner or midwife at some stage of the labour. The organisms may be derived from almost any situation, particularly the person, clothing or instruments of the attendant and the inadequately cleansed perineal region of the patient herself.

In addition to infection which occurs during the actual labour, there may be infection during the puerperium. This may arise from contamination of any broken surface, such as a laceration, either by the midwife or the fingers of the patient herself, from the bedding or the unsterilized pad. A further possible source of infection is autoinoculation, which has assumed a considerable importance in medical literature. It is necessary to consider these various possibilities seriatim.

#### Onus of Responsibility.

A statement to the effect that infection may be conveyed through the attendant whether the latter be a medical practitioner or a midwife immediately raises the question of the apportionment of the respective responsibility.

The medical practitioner when associated with a midwife is apt to place the blame on her and to assume an air of righteous indignation and it has been customary to regard that attitude as quite justifiable. It has previously been pointed out that Australian statistics do not support this contention and it is hoped that the further facts to be presented here will compel attention to the grave responsibility of the medical profession itself.

From the nature of their daily work who is more apt to carry infection, the one who attends patients with erysipelas, ulcers, suppurating wounds, septic abortions, infected throats and noses, boils, carbuncles and the like or the one who does not?

After carrying out the duties just mentioned the medical practitioner may be suddenly called to a confinement where there are few, if any, facilities for the effective sterilization of his hands. The risk could be reduced by means of rubber gloves, but I think it may be reasonably asserted that these are by no means the rule.

Who is more apt to expedite the labour by instrumental means thereby increasing the potentiality of danger—the busy practitioner or the midwife with time to spare?

Instrumental delivery involves anaesthesia which is generally carried out in the absence of skilled assistance. During the operative manipulation the practitioner is frequently called upon to attend to the anaesthetic or some complication and there is no time for subsequent sterilization of his hands.

Would such a practice be tolerated in any operating theatre? The shade of Lister would be expected to appear and point an accusing finger. Yet in dealing with a raw surface greater than any liable to be met with in any branch of operative surgery the greatest risks are assumed with equanimity. It is peculiar how in a minor surgical operation every care is taken in the preparation of the skin which is closely shaved prior to sterilization by antiseptics. This antiseptic technique is not universally practised in obstetrics, for it is by no means the rule to shave the vulva which is, except the head, the most dense hair bearing area of the female body.<sup>(15)</sup> The medical practitioner in charge of the case must certainly assume responsibility for any conditions prejudicial to the welfare of his patient and so long as he neglects to eliminate, so far as possible, such conditions the onus belongs to him.

It is well recognized that the mortality of externe (hospital) cases is remarkably low and that infection is conspicuous by its absence under circumstances and conditions where one can at times reasonably anticipate it. In these cases operative midwifery is rarely undertaken, the case being allowed to proceed quite naturally.

It is equally well known that mortality and morbidity are greater among operative cases, even with the whole of the facilities of a modern hospital at command, than among non-operative cases. How much worse will they be when carried out under ordinary conditions of general practice?

Is puerperal infection due to lack of asepsis and antisepsis only in those cases where operative procedures are undertaken or in those also where the labour is normal? For the most part it is a concomitant of operative midwifery.

There are no statistics available in Australia which will allow a direct comparison of the results obtained in practice by the medical practitioner and the midwife respectively.

The following table (Table XI.) relating to Glasgow will afford some evidence for comparison.

Geddes<sup>(16)</sup> makes out a very strong indictment against the medical practitioner concerning his responsibility for puerperal infection.

TABLE XI.—GLASGOW.—INCIDENCE OF PUERPERAL FEVER (AVERAGE OF TEN YEARS) WITH ATTENDANCE AT BIRTH.<sup>(10)</sup>

Persons Attending.	Proportion of Births.	Proportion of Puerperal Fever.
Doctors only (at home) . . . .	29	26
Midwives only (at home) . . . .	47	34
Midwives and doctors subsequently (at home) . . . .	15	8
Institutional nurses . . . . .	10	13
Institutional doctors . . . . .	—	14
Others . . . . .	—	5

This table shows that midwives compare favourably with doctors regarding the results of their practice with particular reference to puerperal fever.

I hope I have convinced the reader: (i.) That the clinical features of every form of puerperal fever can be accounted for if we admit contamination by septic wounds; (ii.) that the organisms associated with puerperal fever are also present in septic wounds; (iii.) that septic wounds are more frequent in districts where accidents are frequent; (iv.) that the incidence is highest in these districts and lowest where accidents are rare; (v.) that septic wounds are the most likely source of contamination; (vi.) that medical practitioners are the most likely members of society to become contaminated by septic wounds.

Admitting that the doctor is frequently compelled to undertake most serious difficulties without warning and without skilled assistance, that the abnormal rather than the normal comes his way, that the infection in the practice of midwives should, therefore, be more capable of control than is possible in his case, it is a matter for serious consideration by the medical profession whether it can afford to cast the first stone at the midwife.

Let us, at least, be quite fair and impartial. The midwife is generally by no means a paragon of aseptic and antiseptic perfection, but we must guard against the medical profession adopting the attitude of the Pharisee.

#### *Infection Introduced Subsequently to Delivery.*

Certain cases of puerperal infection undoubtedly arise in consequence of the infection having been introduced subsequently to parturition. It is the probable explanation of infection in those cases in which the child is born before the arrival of either the doctor or midwife and in which, therefore, no internal examinations nor other procedure could have been carried out by them. It is, of course, extremely difficult to eliminate the possibility of some examination or attention having been made or given by a neighbour or even attempted by the mother herself. It is more than probable that if the mother has been caught unprepared in the matter of assistance, she will also be unprepared in regard to the necessary cleansing of the bowel and the ano-perineal region, either of which would tend to increase the possibility of infection.

In the hurry, consequent upon the arrival of the attendant, the "toilet of the perineum" is apt to be perfunctory; there may be no time for sterilization even of the hands, whilst lacerations, unless



glaringly obvious, may be overlooked and even if infection be escaped from, they may become a fruitful source of morbidity in later years. The majority of untrained midwives do not use sterilized pads or diapers. The necessity for such does not come within their conception of asepsis; hence any piece of material which is comparatively clean to the eye is considered "good enough."

In how many instances are the bedding and similar accessories thoroughly disinfected after a case of puerperal sepsis? "It is recorded in *Public Health* in 1893 that one man lost three wives from puerperal fever and when the last case was investigated it was found that all three were confined in the same bed which had not been disinfected."<sup>(1)</sup>

It has been pointed out how frequently midwives take on more cases than they can efficiently manage. This results in the patient being seen at most twice each day and the patient is faced with the choice of two alternatives either of which, though she of course does not realize it, is fraught with danger to her life. Either she must depend upon her own unskilled efforts or on those of a neighbour or friend to change the dressings or she must tolerate many hours' accumulation of lochial drainage which forms such an admirable nidus for the growth of organisms.

#### *Auto-Infection.*

Sterility of the vagina and cervix of the pregnant or parturient woman is certainly not a universal rule. The maternal passages frequently harbour a vast and varied assortment of organisms and may under certain conditions contain organisms such as the streptococcus and the gonococcus concerning whose potential virulence there is no question.

Infection of the mother from her own tissues or secretions is then a possibility, but so far as my experience goes, it is a possibility which will be invoked in inverse proportion to the completeness of the investigation concerning other factors.

Whilst there is no doubt that a certain proportion of normal healthy pregnant women have streptococci in their vaginal secretion, there is little conclusive proof that these are usually pathogenic; in fact, it has been definitely established that in such cases the puerperium may be afebrile. We have a somewhat similar analogy in the case of pseudodiphtheria organisms in the throat, where these are morphologically and culturally indistinguishable from the true diphtheria, but are nevertheless avirulent.

There is certainly no consensus of medical opinion concerning the sterility or infectiveness of the normal female genital tract. Between the opposing contentions it is justifiable to adopt a somewhat intermediate position; that whilst infection of the genital tract does exist in a certain number of pregnant women, the proportion so infected is much higher than the proportion affected with puerperal sepsis or with secondary local inflammatory complications that arise during the puerperium among such cases.

It may reasonably be argued that the individual susceptibility of the patient is the factor which controls the situation, but on general bacteriological principles which are verified by practical experience, one may feel sure that individuals are generally immune to their own organisms; otherwise the rarity of general infection after operations on the anus and rectum would not be such a well recognized fact. Allowing that it is a factor worthy of the deepest consideration, it seems to me it is by no means the most important one.

Were it not for the "antiseptic ritual," defective though this often is, it is probable that the disproportion between the number of patients with infected genital tracts and the number who suffer from local or general infections, would be considerably reduced and the latter would closely approximate to the former.

There is still another path of infection, the blood stream, which, though an acknowledged fact, is very rare. The majority of these patients give indications of prospective trouble during the period of pregnancy, when the majority could be anticipated by antenatal supervision and care.

Taking all the possibilities into consideration "the final word on the question as to what is the most scientific way of dealing with the puerperal period has been spoken—asepsis and antiseptics; the other question as to how the infection arises in all cases may be left for future work."<sup>(1)</sup>

#### *The Prevention of Puerperal Septic Infection.*

From what has been already said it will readily be inferred that the vast majority of cases of puerperal septic infection are preventable. In the more serious types of infection the mortality is so great that it has been truly stated that the only effective treatment is to prevent it.

Why do not medical practitioners prevent the occurrence of puerperal sepsis in their obstetric work? Why do they not put into practice the precise principles which have been shown in our obstetric hospitals to be completely adequate. As a matter of fact there are two causes for this failure. It is of no use trying to shut our eyes to them. One is that there is too much meddling interference with a natural process and the other is that proper regard to the principles of asepsis and antiseptics, when interference is indicated, is not considered of the same vital importance as in surgery.<sup>(2)</sup>

Regarding the question of asepsis and antiseptics there is a marked diversity of opinion.

While some practitioners plead for strict asepsis and extensive disinfection, others are mistrustful of the "new fangled notions" and point to a successful obstetric career as evidence that reform is unnecessary. Such diversity of opinion suggests that a skilful practitioner may often pursue with impunity and success methods which might be disastrous in less careful hands.<sup>(3)</sup>

It is generally agreed, however, that (a) extensive and prolonged intrauterine manipulation, (b) lacerations of the perineum, vagina and cervix and (c) manual removal of the placenta account for a large proportion of infections and that (d) severe hæmorrhage and exhaustion during labour are important predisposing factors of septicæmia by diminishing resistance.<sup>(11)</sup>

It may be assumed that there will be universal agreement regarding at least the theoretical necessity for some form of aseptic or antiseptic practice in the conduct of labour. It is in connexion with the actual methods and the essential degree of asepsis and antiseptics where conflict of opinion arises. Though the actual microorganisms concerned in the production of puerperal infection have not been accurately differentiated or the habitat of the more usual ones definitely determined and consequently precise methods for their elimination not formulated, we know sufficient of the history of puerperal sepsis and of its past ravages to realize that asepsis and antiseptics in the broadest sense of the terms are the beacon lights on the road to its successful control.

Whatever be the irreducible minimum under different conditions, there can be little doubt that the margin of safety is greater in the case where the woman delivers herself naturally without any assistance involving internal manipulation or examination, than in the case where operative midwifery is necessary. It is probable that the technique of the attendant may in such circumstances fall far short of the ideal without being followed by retributive disaster. Although such a technique may prove quite satisfactory for most normal cases, others will arise where such technique is not sufficiently comprehensive or thorough to prevent infection. Herein lies a danger; familiarity with a defective technique which is not necessarily followed by infection, has a grave tendency to establish the former as being all that is required.

It is an astounding and surprising fact how frequently medical men will tolerate unintentionally a state of affairs, especially where such conditions arise slowly by a gradual process, which each individually would condemn outright on general principles.

The following instance, the result of a personal investigation, will show how professional judgement may be lulled with a sense of false security.

At an Australian semipublic hospital patients with gynaecological and obstetric conditions were treated successfully for several years. The visiting medical staff was composed of efficient and competent practitioners. There was no resident medical staff. A serious fulminating epidemic of puerperal septicaemia closed the hospital for months. Inquiry showed that although the gynaecological patients were treated on a different floor to the obstetric patients, the nursing staffs were for purposes of economy utilized indiscriminately on either floor according to the requirements of the hospital. The necessary reorganization having been effected, the difficulty was controlled. Each medical man recognized the position immediately on its being pointed out, but quite unintentionally tolerated the inevitable transfer of infection from the gynaecological to the obstetric patients.

Familiarity with mediocre standards will tend to breed contempt for the ideal and in this connexion a good professional working motto would be:

"He who aims at the sky, will shoot higher than he who aims at a tree." There is no necessity to run to extremes and to advocate such impossible ideals as the absolute sterilization by artificial means of the parturient canal.

Although we cannot achieve the impossible, much can be done to stem the tide of maternal mortality and morbidity by efforts directed towards the elimination or control of conditions detrimental to the parturient woman, in accordance with the methods and principles verified by experience, which are known by all medical men and should be known by every midwife.

These principles may be conveniently grouped under the following headings which will permit discussion of the question of prevention from various angles.

1. *The Prevention of Sepsis by its Anticipation.*—Much of the puerperal infection subsequent to parturition could be avoided by anticipating it during the later months of pregnancy. It is not intended to discuss here the subject of antenatal care and supervision in general terms, but only in so far as it relates to the prevention of puerperal infection. Its special value for this purpose is to eliminate whenever possible those maternal conditions which tend to cause difficulty in labour. By this means the actual number of difficult labours which involve operative procedures, should not only be reduced by timely attention, but also those which cannot be prevented, can at least be attended under suitable conditions instead of in an ordinary home where the facilities essential for the safe conduct of emergency operations may be entirely absent.

Operative midwifery is so extremely liable to facilitate infection either by direct inoculation or by damage to the tissues, thereby rendering them vulnerable to organisms, that every means to avoid its necessity should be adopted.

Antenatal examination would give an opportunity for the treatment of possible sources of direct infection from some focus in the mother herself. Instead of the mother assuming that a vaginal discharge is merely "the whites," the condition would be definitely diagnosed and the possibility of its being due to gonococcal or other infection determined.

With most of the pitfalls eradicated, the mother and the medical practitioner may face the issue with the full assurance that the possibility of some untoward occurrence is remote whilst the necessity for gaining information by vaginal examination at the last moment when it should have been obtained some time previously will be reduced to a minimum.

2. *The Management of Labour.*—The different attitude adopted by the medical profession in regard to surgery to that assumed in regard to midwifery has been already mentioned. This has been pointed out by many authorities on numerous occasions. (18) (19)

There is no need to reiterate by laying down certain minimum requirements, but it is necessary to point out any defect in method or technique which tends to produce unsatisfactory results. It

is a standing rule in all modern maternity hospitals that the pubic hair is removed by shaving as a first step of the perineal toilet. The scrupulous preparation of the vulva and adjacent parts during and after delivery has been an important factor in reducing the morbidity of lying-in women.<sup>(20)</sup> If shaving and intensive preparation are essential in hospitals where you have an intelligent and trained staff, ideal conditions and adequate sterilization of dressings, why is it considered unessential in outside practice?

The same question may be asked in regard to the wearing of gloves.

Is it merely a pedantic refinement for all associated with a delivery in hospital to wear rubber gloves? If they be necessary for such a staff which deals only with obstetric patients, how much more necessary are they for the average medical practitioner whose daily work may bring his hands into contact with every variety of septic material? Considering that to control hæmorrhage it may be necessary to insert the hand into the uterus at any moment, the desirability of wearing gloves is quite evident. Certainly gloves are not a substitute for the efficient sterilization of the hands and if regarded as such, are liable to be more a curse than a blessing, but with intelligent use they are undoubtedly an additional safeguard.

If the preparation of the patient be left to a registered but untrained midwife, there will probably be many shortcomings in the technique which will be frequently unobserved by the busy practitioner called in at the last moment. Sterilized pads are not usually provided by the midwife, since she usually instructs the prospective mother to maintain a supply of rags euphoniously termed linen. What is the use under these circumstances of elaborate aseptic and antiseptic preparation when subsequently the whole of such efforts can be annulled by an unclean or contaminated diaper?

Having delivered the placenta, the medical attendant, if present, is apt to regard his work for the time being at an end. He relies on the nurse or midwife to attend to the dressings, scarcely thinking, perhaps, that the whole of his precautions may be thereby rendered vain. The average midwife has an extremely hazy conception of the efficacy or proper use of antiseptics. She is apt to consider that the germicidal potency of any preparation varies in direct proportion to the strength of its aroma and the pungent odour of certain coal-tar disinfectants is in this respect very misleading.

There is a class of antiseptics cheap to make, dear to buy and strong to smell, which in dilutions of efficient strength are too irritating to be applied with propriety to either the exterior or the interior surfaces of the human body. In dilutions weak enough to be comparatively harmless, their use appears to give to midwives and others a sense of false security and satisfaction probably accounted for by the odour of the preparations in question. But in this odorous fool's paradise there is often neglect of the details of ordinary domestic cleanliness which are more important than antiseptics in obstetric work.<sup>(22)</sup>

Certain complications arising during labour tend to facilitate the advent of puerperal infection.

Perhaps the most frequent of all is a rupture of the perineum which may or may not be accompanied by a laceration of the cervix. A rupture of the perineum, particularly in a *primipara*, is not *per se* evidence of bad midwifery, but neglect to repair the damage is a most serious omission. An unattended torn or lacerated perineum is not only an immediate source of danger as a channel for infection, but is a potential mine of future morbidity and invalidism.

This may sound like platitude to medical ears, but personal experience urges the necessity for its frequent repetition so far as midwives are concerned.

It has been pointed out why midwives are reluctant to send for a medical man and it is just in these cases that this duty is so often neglected. The results, where the woman does not suffer from infection, can be seen in gynæcological disabilities such as various forms of uterine displacements which make the memory of childbearing such a nightmare to many women.

The removal of an adherent placenta or the control of *post partum* hæmorrhage are two other complications of labour which are liable to be followed by infection introduced by the hand which comes into close contact with the open blood vessels in the large raw surface of the placental site.

There is no operation in surgery so fraught with danger as the introduction of the hand into the uterus. When this is carried out under the ideal conditions of a well-equipped hospital, the undertaking is regarded as hazardous and the danger must be increased enormously when undertaken in an ordinary home. Under any circumstances the necessary antiseptic precautions cannot be too thorough and it should always be borne in mind that when carried out in an ordinary home, the scales are to that extent weighted against the patient. Any operative procedure in midwifery increases the possibility of infection and although the medical practitioner has often to choose the lesser of two evils, there is much evidence that these operations are frequently undertaken somewhat lightly. "Familiarity breeds contempt," so that the experience of having successfully managed such cases in the past is considered to be a warrant for similar treatment of cases in the future.

The responsibility for undertaking operative midwifery under unsatisfactory surroundings is a very grave one, for, apart from the danger inherent in the operation itself, the subsequent nursing and treatment calls for special consideration. The average practitioner when faced with a surgical emergency does not consider it derogatory to his prestige to obtain the advice and help of a colleague. Yet in the practice of midwifery there seems to be an unwritten law that every medical man who considers himself competent, should be prepared to manage successfully generally single-handed each and every serious obstetric operation, compared with which from the point of view of danger the majority of surgical operations dwindle into insignificance.

The practitioner is often summoned purely to meet such emergency and then finds himself in the



difficult position of having to make a decision almost instantaneously. There may be little or no time for adequate antiseptic preparation and the risk is taken. If his efforts meet with success, so much to the good, but unless he is extremely conscientious, his obstetric susceptibilities are in consequence blunted and the standard of an inevitable necessity may become the standard of succeeding practice.

Whatever may be said in extenuation of operative manipulations by the plea of emergency in relieving obstruction, controlling hæmorrhage and suchlike complications, there is one operation far too frequently undertaken, which cannot be too readily justified—the saving of time by the application of forceps.

The question of the use and abuse of forceps is what may be termed a hardy perennial in medical literature. Impassioned and eloquent appeals against their abuse appear to fail in their purpose leaving the position much the same from year to year.

Once it is allowed that forceps can be justified for the sake of expediting delivery either for the benefit of the doctor or to appease the clamour of the mother or her friends, the whole basis of natural midwifery vanishes.

Matthews Duncan<sup>(21)</sup> many years ago pointed out the danger of hurried midwifery.

There is no obstetric doctrine more deeply impressed on all the valuable literature of our profession than this; that the mere duration of labour considered in itself and apart from other causes of danger likely to spring up as the process becomes protracted, is of little importance so far at least as the recovery of the mother is concerned. This doctrine is embodied in the ever recurring inculcation of patience as the highest virtue of both mother and attendant in many and varied circumstances of distress during labour. Sometimes it is expressed in an apophthegm "Meddlesome midwifery is bad." . . . The proposition does not affirm that the mere duration of labour is of no importance—quite the reverse— . . . It asserts that the duration of labour is in itself (*per se*) only an inconsiderable part (probably a very inconsiderable part) of the many causes of the mortality of women from parturition and its consequences.

The propositions laid down by Duncan have since been confirmed by recent investigators, not only in regard to maternal but also in regard to infantile mortality especially of the period covered by the first two weeks after birth.<sup>(22)</sup>

It may be argued that if instrumental delivery carries with it such potentiality for trouble, why are so many practitioners able to carry on their midwifery practice with so much immunity? This question may perhaps be best answered by asking another: Would the results be better if confinements were allowed to take their natural course without being subjected to instrumentation?

It will surely be admitted that manual interference involves a risk and that the more frequently this risk is taken, the greater is the liability of disastrous consequences. Whether the risk is incurred somewhat too readily in general practice may be a matter of opinion, but certain evidence tends to show that it is a fact.

Out of 1,654 deliveries at a large maternity hospital<sup>(23)</sup> there were 143 or 8% delivered by forceps. Of these 143 cases, 108 or 6% of the total instrumental deliveries were necessitated by delayed second stage or dystocia due to persistent occipito-posterior presentation, conditions which embrace the vast majority of indications for the application of forceps. These cases no doubt represent a selected class, but selected to a great extent on account of their difficulty or gravity.

In another similar institution<sup>(24)</sup> there were 937 accouchements of which thirty-seven or between 3% and 4% were delivered by instruments. *Primiparæ* accounted for 356 of the total number of 937.

In the externe obstetric department 215 women, of whom twenty-nine were *primiparæ*, were delivered. Instruments were used in only one case.

Can it be said that the average practitioner uses forceps no more frequently than in 3% to 6% of his cases? Granting that there is much to be said in his favour owing to the circumstances in which he finds his patient not being the equivalent of hospital conditions and that his actions are generally well motivated, the fact remains that an additional hazard is undertaken which could in many cases be avoided.

From personal investigations among medical men the conclusion has been forced upon me that there is an unhealthy rivalry in the profession in the field of midwifery. It would appear that the pressure of public opinion weighs too heavily against professional judgement.

A disinclination on the part of the medical man to expedite delivery is apt to be misinterpreted as inefficient midwifery by the patient and her friends. A practitioner is liable to enhance his reputation by the almost universal use of forceps, whilst his colleague, actuated by the highest motives, may suffer in virtue of his reluctance for indiscriminate instrumentation. So long as one competitor adopts the practice, all others must show an equal competence. Attendance upon normal labour should not be an opportunity for the display of legerdemain or any wonderful *tour de maître*, but rather for the exercise of a discriminating but masterful patience.

An obstetrician in a hurry is dangerous. . . . There has of late years especially been a boom so to speak in operative delivery and Cæsarean section is being advocated so widely that the art of obstetrics seems likely to be lost. In the United States of America an important group of younger obstetricians are advocating and practising induction of labour in all cases before term to save the patient from the discomfort of the last few weeks of pregnancy.

Others are found to advocate delivery by forceps and preliminary incision of perineum in all cases as soon as the first stage has been completed. This is called the "prophylactic forceps operation" and is designed to secure a stronger pelvic floor after labour.<sup>(25)</sup>

The relationship between forceps and sepsis may be seen in the following facts.

In over 21% of the cases of puerperal fever occurring in the city of Glasgow during 1921, forceps were ascribed as the probable source of

infection. In 1922 the proportion was 20% and in 1923 it was 25% and of the latter cases 38% terminated fatally.<sup>(10)</sup>

From an analysis of seven thousand cases divided equally into hospital and district cases in the Maternity Department of The Women's College Hospital, Pennsylvania, it was found that the morbidity in non-operative cases was 5.5% among the patients delivered in hospital and 1.6% in the district. There was a definite increase in the morbidity among non-operative cases in *primiparæ* as compared with *multiparæ* and the influence of long labour and repeated vaginal examinations could be traced. The percentage morbidity in cases where operative procedures were used was 22.9% in hospital and 8% in district, the incidence of post-operative morbidity being two to four times as great in *primiparæ* as in *multiparæ*. The standard of morbidity utilized was "every case in which there is a rise of temperature to 100° F. or more for three successive days or longer."<sup>(13)</sup>

It is not only that the forceps alone may be the means of directly introducing infection, but that their frequent use tends to encourage an impetuosity which may ultimately lead to their application at an early stage of labour before the maternal tissues are sufficiently dilated.

Such methods are indeed openly advocated in current medical literature and the recommendation that all cases should be treated by complete manual dilatation of vagina and cervix is apparently regarded as up-to-the-moment midwifery.<sup>(26)</sup> Considering that Nature herself cannot succeed in dilating all cervices without tearing, the sequelæ from manual intervention can be readily foreseen.

It is no wonder that one leading authority has felt constrained to say: "That in the case of woman-kind this additional supplication should be added to the Litany: From the obstetric forceps and the uterine curette, Good Lord, deliver us! They are the two most dangerous instruments which any doctor may legitimately use in the practice of his profession."<sup>(27)</sup>

It would appear then from this brief survey that forceps play an important part in the causation of puerperal mortality and morbidity and the necessity for taking stock of the position is urgent. If medical men utilized efficiently the resources at their command, pituitrin, sedatives and the like, there would be less need for instrumentation and less inclination to indulge in the passing craze of the moment whether the latter be some variety of "high forceps" or the spectacular delivery of every individual case by means of podalic version.<sup>(28)</sup>

For reasons which will be evident from a perusal of the foregoing remarks, any reform in the professional attitude must come from the profession as a whole. The individual practitioner cannot be expected to stand alone and until public opinion is educated by the authoritative teaching of the whole profession, the isolated practitioner may suffer for his convictions. Masterful inactivity is not an

easy position to maintain in most circumstances, but it may become intolerable under present conditions in the field of obstetrics.

3. *The Management of the Puerperium.*—The management of the confinement subsequently to the birth of the placenta is not accorded the same importance as any event prior to its expulsion. All precautions and all efforts may, however, be rendered useless by inefficient nursing and attention during the puerperium.

It is impossible to say how many cases of puerperal infection arise as a result of some defect of management during the puerperium, but there is ample opportunity for infection to be implanted at this stage. Careful nursing is desirable after any confinement, but it is absolutely essential for the woman who has survived the ordeal of a difficult or complicated labour. It is doubtful whether the ordinary midwife should be entrusted with the care of such a case where skilful care and antiseptic thoroughness mean everything.

Further, she is not conversant with the early signs of danger and is apt to misinterpret them even when obvious to the more expert observer. To add to the difficulty the average midwife does not as a rule take only one patient at a time, but may have several at considerable distance from each other under her charge. In consequence the attention which should be continuous, is spasmodic and hurried; abdominal pain, if complained of, is explained away as "after pains," headache as due to constipation, malaise as a whim or mood of the patient, whilst fever which is usually of the hectic type in these cases, may not coincide with the midwife's visit and being unrecognized, is deemed to be absent.

If a douche has been ordered by the doctor, it is quite within the bounds of possibility that it will be given through the same nozzle as is used for the enema syringe which has not been sterilized. When puerperal infection is unmistakably present, it is too late in most cases then to obtain any benefit from the skilled nursing of a fully trained nurse.

The difficulties of the position are inextricably bound up with other factors already enumerated as being causally related to maternal mortality and morbidity. The management of the puerperium, usually regarded as of secondary importance compared to the actual labour, may nevertheless turn the scales against the patient and on this account must be considered as still one more link in the chain of causation. This aspect of the problem opens up the question of the training of midwives which will be dealt with in another section.

4. *Notification of Puerperal Infection.*—The first step in the control of any infectious disease is an accurate and immediate knowledge of its existence. For this reason "puerperal fever" has been proclaimed as a notifiable disease in most of the States of the Commonwealth.<sup>1</sup>

<sup>1</sup> Puerperal fever is notifiable in every State except New South Wales.

The term "puerperal fever" is not defined, so far as I know, in any act, proclamation or regulation in force in Australia and yet there is probably no term in medical nomenclature concerning which there is such a diversity of opinion among medical men as to what is and what is not "puerperal fever."

The term is a general one and the condition which it implies, is assumed to be capable of definite recognition. In reality it embraces numerous conditions<sup>1</sup> which vary considerably, but whose one common factor is that they originate in some septic complication in connexion with childbirth.

Each medical practitioner will have his own idea on the subject and a condition which would be notified by one, would not be notified by another. There has never been any authoritative ruling whether septicaemia following miscarriage should be notified as puerperal fever nor whether sapraemia should be regarded as an early indication of a notifiable septicaemia. In the presence of such glaring anomalies it will scarcely produce surprise to realize that the notification of the condition has not been complied with and further that notification has been of practically little or no benefit.

The actual position may be seen in the following table (Table XII.).

TABLE XII.—PUERPERAL FEVER NOTIFICATIONS IN ALL STATES (EXCEPT NEW SOUTH WALES).

State.	1920.	1921.	1922.	1923.
Victoria ..	8 (Melbourne only)	1	65 (39)	42 (54)
South Australia	23 (19)	22 (23)	16 (11)	1
Queensland	29 (28)	29 (25)	13 (23)	22 (34)
Western Australia	5 (14)	16 (5)	10 (11)	1
Tasmania	11 (3)	22 (10)	16 (15)	1

Information obtained from annual reports of respective Public Health Departments.

<sup>1</sup> Figures not available.

Figures in parentheses represent the actual deaths registered as being due to puerperal septicaemia.

The above table shows that the notification of puerperal fever if not useless, is extremely unsatisfactory. Where the actual deaths do not exceed the notifications, they approximate so closely as to result in a case mortality which is obviously far too high.

<sup>1</sup> In the international list of causes of death the conditions embraced by the term puerperal fever are stated as follows:

Milk fever.	Puerperal infection.
Postabortive sepsis.	Puerperal inflammation of uterus.
Post partum pyæmia.	Puerperal lymphangitis.
Post partum sepsis.	Puerperal metritis.
Post partum septicaemia.	Puerperal metropéritonitis.
Puerperal abscess of broad ligament.	Puerperal metrosalpingitis.
Puerperal cellulitis.	Puerperal parametritis.
Puerperal endometritis.	Puerperal pelvic abscess.
Puerperal erysipelas.	Puerperal parauterine abscess.
Puerperal fever.	Puerperal pelvic cellulitis.

Both notifications and deaths are but a very rough index of the actual incidence of sepsis, inasmuch as the former do not include a very large quota of recoveries and the latter only record the tragedies. In other words, a great number of cases undoubtedly occur which never see any register, but which help at a later date to swell the gynæcological out-patient department and the consulting room.<sup>(29)</sup>

Under existing circumstances a notification of "puerperal fever" may be regarded as an indication that the patient, if not moribund, is in *extremis* and for the purposes of prevention is of little value.

Notification only comes in when prophylaxis has failed; our next line of defence is to overtake the disease in its earliest stages and that is only possible if the suspicious as well as the frankly manifest cases are included in such notification. Treatment is likely to be most effective in the early stages and if notification is to be preventive of further spread, a trifling and transient pyrexia which may be the start of an outbreak of more serious infection, should not be excluded.<sup>(30)</sup>

Notification *per se* is not a talisman; by itself it is no more effective in controlling puerperal infection than the repetition of "abracadabra" would be. Though often erroneously regarded as a panacea, it is and should be a means to an end. Each notification should be the "press of the button" which starts into operation a definite course of action. This action should not be merely inquisitorial, but comprehensively organized to be preventive in two aspects, preventing if possible the death of the patient by facilities for insuring treatment, investigation and so forth and prevention of further spread by ascertaining, if possible, the cause of infection and the collection of data for future guidance. For these reasons every maternal death as well as every case of notified puerperal infection could with profit be forthwith personally investigated by a medical officer of health.

Notification of "puerperal fever" has not produced the results anticipated and even if we grant that it has been a means of controlling the transmission of epidemic infection, it has been inefficacious in the prevention or reduction to any appreciable extent of maternal mortality resulting from sepsis.

This state of affairs is unsatisfactory and a solution of the difficulties must be found if there is to be any progress. The first steps towards this progress are a comprehensive conception of the conditions to be notified and a more exact term which will embrace the latter. In discarding the term "puerperal fever" we automatically assume responsibility for the substitution of something better.

The second difficulty is to decide upon the signs and symptoms which should be regarded by the medical practitioner as indicative of maternal infection.

Several standards of puerperal morbidity have been laid down and it is a question suitable for the earnest consideration of the Australian Branches of the British Medical Association as to



the standard which should be adopted for Australian conditions.<sup>1</sup>

Having established a standard of morbidity, it is essential to lay down the degree of morbidity which must be notified. It is not desirable that medical men should be dictated to nor be made to conform to a standard which is not reasonable, but it is absolutely necessary that a definite understanding be arrived at.

With a characteristic group of febrile symptoms or similar symptom-complex to aid his judgement the medical practitioner would be relieved of much anxiety as to whether the case should or should not be notified.

Combining the two desiderata just mentioned, the substitution of a better term for "puerperal fever" and the prescription of a standard of morbidity, the following is tentatively suggested as being capable of meeting practical requirements and at the same time suitable for being readily cast into legal form for purposes of proclamation:

Every medical man shall, on becoming aware of any case of puerperal septic infection (including puerperal sapræmia, puerperal septicæmia and puerperal pyæmia) or any condition which may be reasonably suspected of being one of puerperal septic infection, immediately notify such case to .....

For the above purpose puerperal septic infection shall mean any condition of an infective or probably infective nature, which produces a maternal temperature of 37.8° C. (100° F.) or higher on two successive occasions within the ten days immediately following the birth of a viable child or a miscarriage before the end of the seventh month of pregnancy.

It will be noted that the condition is definitely defined and that infection arising after miscarriage is notifiable as well as that arising subsequently to parturition at full term.

If notification is to be of use, it should embrace all forms and since miscarriages are frequently followed by sepsis and the nurse attending such a patient may soon afterwards attend a woman during normal delivery, the desirability of obtaining information is obvious.

Assuming that the information can be obtained, the organized machinery for controlling the situation should immediately function.

<sup>1</sup> (a) The British Medical Association includes within the term "puerperal morbidity" all conditions in which the temperature reaches a height of 100° F. on two occasions from the end of the first to the end of the eighth day after delivery (*British Medical Journal Supplement*, May 19, 1906, page 264).

(b) Congress of Puerperal Fever, Strassbourg, August, 1923. Resolutions:

1. The Congress considers that precise rules should be established for determining the temperature in labour and the puerperium and for interpreting the results.
2. The temperature should be taken morning and evening during the hour preceding the meal and also on each occasion when any symptom indicates that there may be a rise of temperature.
3. The record should show whether the temperature has been taken in the armpit or internally and in the latter case the locality chosen. The Congress urges the advantages of the rectal temperature.
4. Excluding the temperature within the twenty-four hours following delivery, every temperature exceeding 38° C. (100.4° F.) on one occasion and persisting more than twelve hours, should be considered pathological during the puerperium (*Gynécologie et Obstétrique*, 1923, Tome VIII., page 432).

Where the patient is able to provide the necessary services, the case may be left entirely to her medical adviser who, however, would be expected to assist in any way the interests of public health.

Where the patient cannot for any reason provide the necessary services, then the latter should be supplied through or with the aid of the various public hospital or health authorities.

The cooperation of the profession, hospital managements, health departments and other organizations may at first be short of perfection, but the difficulties are by no means insuperable.

The public health aspect should not dominate that of the patient herself and provided that facilities which will aid the public health be provided, the profession and the public will soon realize that they are also for the benefit of the patient. The information obtained would be all to the future good and would probably be the means of reducing the incidence of the disease to a minimum. In this as in many other instances public health is purchasable—at a price. The practitioner is apt to be resentful and justifiably so of official inquisition when his experience is that no benefit is derived therefrom. The first step towards success is the active cooperation of the profession; the most certain guarantee of failure is its opposition. In the mind of the medical man there is a certain stigma attached to the occurrence of infection in his practice, which he endeavours to avoid whenever possible. In the judgement of the medical practitioner the merits of notification will vary in direct proportion to the efficiency of the administrative measures for giving help to his patient and to himself. The consummation of the ideal of prevention of sepsis cannot be achieved without the expenditure of effort and money. The greatest defect in the various *Midwives Acts* is that none has been administered with the efficiency which is essential and this is the main reason for the lack of adequate progress. This state of affairs is the result apparently of lack of money, the necessity for which it is difficult to impress upon parliaments. Public health departments are expected to carry on to the best of their ability and so long as an act is not legally infringed, it is thought to be effectively administered; the main principle is therefore expected to eventuate and the ultimate goal reached. This is a fallacious, though comfortable assumption. Until a change of attitude comes about the prospect of deriving real improvement from any form of control of midwives is very remote.

#### Causes Other than Puerperal Septic Infection.

Among the causes of maternal mortality other than puerperal septic infection one cause, puerperal albuminuria and convulsions, stands out prominently. The accidents of pregnancy, puerperal hæmorrhage and difficult labour, whilst individually seldom exacting as many lives as puerperal albuminuria, vary considerably from year to year in the share each takes of the total mortality.

In the whole Commonwealth during the period 1907 to 1923 accidents of pregnancy caused 1,626

deaths, other accidents of childbirth (difficult labour) 1,340 deaths, puerperal hæmorrhage 1,280 deaths respectively. Puerperal *phlegmasia alba dolens* causes a certain number of deaths, but it is a debatable question whether these would not be more accurately tabulated under puerperal septic infection.

#### *Puerperal Albuminuria.*

This term is utilized for statistical purposes to embrace all varieties of toxæmia and not only that form associated with eclamptic convulsions.

We know the number of deaths from this cause, but we have no record of the number of patients who survive. Assuming the average death rate to be about 22.5%,<sup>(31)</sup> then there are probably about six hundred cases in the Commonwealth each year. Inasmuch as 70% of the cases occur in *primigravida*, it follows that this disease is responsible for the annual loss of at least one hundred young mothers bearing their first child.

The actual factors concerned in the production of the disease we do not know; but we know something concerning its prevention and there is no reason why this knowledge should not be acted upon with earnest promptitude.

The best treatment for eclampsia is its prevention and as the majority of patients have a longer or shorter period of premonitory symptoms, such as œdema, headache, disturbances of vision and so forth, there is ample opportunity of forestalling an impending tragedy. This opportunity is, unfortunately, only too often neglected. The unexpected advent of some serious manifestation of eclampsia should in most instances be a reproach to any medical practitioner who is engaged for the anticipated confinement. His duty is clear and unequivocal; he is the pilot entrusted with the responsibility of steering the ship through the safest channel.

Since the average mother has no conception of the pitfalls in the path of pregnancy, neglect on the part of her prospective medical attendant to instruct her in regard to them seems to me to be extremely culpable. The vast majority of cases of eclampsia come, so far as the medical attendant is concerned, as "a bolt from the blue" and yet the patient has generally experienced numerous danger signals the significance of which she was in absolute ignorance. The necessity for frequent examinations of the urine during pregnancy and the institution of appropriate treatment as soon as any abnormality is detected, is accepted as correct procedure by every medical practitioner. The catastrophes are produced not on account of lack of knowledge, but because of not watching for them. By the employment of such precautionary measures the frequency of eclampsia and its accompanying toxæmia would be greatly diminished and many valuable lives saved. Certain cases will arise which, in spite of every attention during pregnancy, will still become eclamptic. These, however, will be very few and will always be regarded as extremely unusual.

#### *Difficult Labour (Other Accidents of Childbirth).*

Difficulties are always liable to arise during the actual progress of labour and success in overcoming them will depend on the skill, resource and initiative of the medical attendant. So long as such difficulties could not have been forestalled, the medical practitioner can only do his best. Under these circumstances the training, competent skill and sound judgement of the medical practitioner in charge of the patient form the sheet-anchor of the situation.

Many difficulties of labour, however, can be foreseen if the patient is submitted to examination during pregnancy. This examination should not be confined to one interview, but should be repeated at reasonable intervals until the pregnancy is terminated. Whilst a gross cause of complication such as a deformed pelvis may be early detected at any time, other factors may not become apparent until the pregnancy is well advanced.

The ideal is that the prospective mother should be under supervision during the whole of her pregnancy. By this means many malpresentations can be corrected while there is ample time and opportunity and a potential danger transformed into a comparatively normal process.

Even when such a favourable change cannot be brought about, the necessary action can be taken to have the patient confined under the best circumstances, instead of subjecting her to the risks of a major obstetric operation in unfavourable surroundings.

It may be thought that an ample indictment has already been levelled at the obstetric forceps when dealing with their relation to puerperal sepsis. It is necessary, however, to emphasize again here the fact that in connexion with difficult labour they may not be an unmixed blessing. The presence of obstetric forceps in the medical practitioner's armamentarium undoubtedly produces confidence and an assurance that great indeed must be the obstruction which cannot be circumvented by their aid. The fact that they afford the means for applying a tremendous extractive force to a persistent occipito-posterior presentation may be a solace when the trouble is being faced, but it does not lessen our moral responsibility for not having obviated the difficulty by timely supervision and alteration of the child's position.

If obstetric forceps did not exist, there is little doubt that greater efforts would be made to guide the course of pregnancy towards a normal labour than is the case at present. When forceps meet with failure, the child is generally lost either by sacrificing it for the benefit of the mother or if eventually delivered, it is stillborn as the result of the necessary manipulations. Again, in the event of failure of forceps, it may be too late to adopt other procedures, such as Cæsarean section, and not only the child but its mother also is doomed.

Reliance on forceps as the principal means of overcoming obstructive difficulties throws the medical practitioner on to his main line of defence; if this fails, the capitulation of his whole fortress is

probable. How much better to meet the danger on the outskirts of the position and to choose one's own ground for the contest? In this event there is at least another position upon which to fall back and it will probably be found that this will be utilized less frequently than where no preparation for the contest is made.

#### *Puerperal Hæmorrhage.*

The two main varieties of hæmorrhage, *ante partum* and *post partum*, constitute a formidable complication which may tax the most competent practitioner to the limit of his ability.

*Post partum* hæmorrhage particularly is liable to supervene without the slightest warning and will demand immediate action to save the patient's life.

*Ante partum* hæmorrhage, accidental or unavoidable, like the *post partum* variety cannot be foreseen and it would seem that antenatal care has distinct limitations in this field.

If *ante partum* hæmorrhage is entirely due, as many authorities believe, to a separation of the placenta, then the only means of control lies in skilful treatment as soon as the condition is recognized and the prospect of its prevention seems somewhat remote. On the other hand, certain authorities believe that a close relationship exists between nephritis with its consequent toxæmia and premature separation of the placenta. If this be so, then the systematic examination of the urine during the time the pregnant woman is under antenatal care should go far towards reducing, if not entirely averting, the number of catastrophes which arise from this cause.

The occurrence of slight hæmorrhage during pregnancy is not always given the attention it merits. Each patient should be carefully examined as it is not sufficient merely to tell the patient to rest in bed. This advice may be the means of postponing the evil day, but so far as the patient's life is concerned it may make that day inevitably fatal.

So far as is possible a definite diagnosis should be made and whatever the cause, *placenta prævia* or accidental hæmorrhage, the patient should be placed in such surroundings as will afford every opportunity for successful treatment in case of emergency.

The medical profession is, undoubtedly, seized with the importance of this complication, but, nevertheless, there is reason to believe that if hospital accommodation were utilized more freely at the first indication of danger, some of the deaths might be avoided. The difficulty involved in hospitalization of even a majority of the patients is recognized, but every attempt should be made to this end where facilities are available, because it is not only a formidable undertaking to treat these women in a small home, but it is perhaps not quite fair to the patient herself.

In the ordinary house assistance is not readily available; facilities which may be required immediately, are not to hand; moments are precious and whilst we are endeavouring to do the best under the

awkward circumstances, the patient is liable to die under our eyes.

*Post partum* hæmorrhage is practically unavoidable so far as present knowledge allows us to judge and its successful management will depend upon the skill and promptitude of the medical attendant.

#### REMOTE MATERNAL MORBIDITY.

The actual deaths resulting from the various causes which have so far been considered, are definitely known. To that extent we can form a fairly accurate idea of the scope of the problem. The mortality returns, however, only record the tragedies and leave out of account a large but unascertainable amount of morbidity resulting from the ill effects of childbirth on the surviving mothers.

Maternal morbidity is not confined to the periods of gestation and the puerperium, but may extend to a much later date.

Of one thousand women treated for gynecological complaints, 65% had borne children and 28% suffered from disabilities attributed to previous confinements as follows:<sup>1</sup>

Sepsis and its effects	9%
Lacerations including fistulae	5%
Prolapse of rectum, bladder or uterus	10%
Other displacements of uterus	4%

From the economic and social standpoint this ill-health and suffering is more important than much of the morbidity and most of the mortality shown in the previous sections. It represents for a large number of women protracted illness, chronic invalidism and incapacity of varying degree, perhaps for the remainder of their lives, which might have been avoided.

It is obvious to anyone who has had charge of a large gynecological out-patient department, that far more cases of the minor diseases of women are the direct result of obstetric operations performed too soon than too late.<sup>(2)</sup>

Here we have the repercussion of meddlesome midwifery rising to its grand finale in a crescendo of postponed misery.

In practically all cases of maternal morbidity there has been a failure in efficiency at some point. The omission may have been during pregnancy, so that a minor difficulty becomes a desperate emergency; it may have occurred during labour, failure to handle a difficult case with due skill and judgement, lack of asepsis and antiseptic precautions particularly in operative cases, neglect to repair lacerations or other injuries, any of which may result in one or more morbid conditions detrimental to the health and well-being of the mother. Of all complications which are not in themselves fatal, the one which is most common and most liable, if neglected, to be the forerunner of maternal ill-health, is laceration of the perineum. The imperative necessity for the immediate repair of all perineal lacerations is universally recognized, but it is

<sup>1</sup> Scottish Departmental Report (page 10). Somewhat similar proportions of the conditions mentioned were found in the gynecological cases treated in the Sydney and Royal Prince Alfred Hospitals (Sydney) during 1924.



quite common knowledge that this necessity is frequently neglected. It is by no means the established rule for the medical practitioner to make certain before relinquishing professional attendance that his patient has no abnormality liable to produce future morbidity. Even where repair of the perineum is effected immediately after childbirth, it is usually assumed that everything is satisfactory. At best the opinion of the nurse that the wound has healed satisfactorily, is the generally accepted criterion that the patient has therefore a satisfactory pelvic floor.

The medical profession must recognize the enormous responsibility devolving upon it since in its hands lies the power of eliminating these and many other allied defects.

It has always been the honourable tradition in the medical profession that responsibilities once clearly proven must be accepted and that immediate measures be taken to fulfil all consequent obligations without argument.<sup>(22)</sup>

It is hoped that the facts so far elicited will provoke serious thought and consideration even if they fail to carry definite conviction.

#### THE PREVENTION OF MATERNAL MORBIDITY AND MORTALITY.

It was pointed out very early in this essay that no one cause can be singled out as the determining factor in the production of maternal mortality. If this were possible, the solution of the difficulty would be comparatively simple. The problem, however, is extremely complex and it is only by controlling all the factors and directing them into beneficial rather than into detrimental channels that we shall, eventually, attain the objective aimed at—the prevention of all preventible death and injury.

The inquiry into the possible means of prevention may be considered under the following headings.

#### Improvement of the Professional Attention Bestowed Upon the Mother.

That there is ample room for improvement in the care and skill given to midwifery cases is, I think, quite evident. The defects in this regard are due not so much to lack of skill on the part of medical practitioners, but rather to the latter not thoroughly and effectively utilizing the skill and knowledge which they possess. Frequently the medical attendant by being called too late, if at all, is not given the opportunity to control the position.

On the other hand the profession must assume responsibility for the imperfect and partial application of principles which are recognized at least theoretically to be practicable and essential.

"Safety first" is apparently not yet a working motto in the field of midwifery, otherwise in place of the comparatively few women who are supervised during pregnancy, we would have the vast majority receiving antenatal care.

The risks attendant upon operative manipulations have been pointed out on numerous occasions, yet they are still carried out in defiance of the principles established both by theory and experience and often under conditions which invite disaster.

Even when the medical practitioner's work is above reproach, it may be rendered useless by lack of skilled nursing on the part of the midwife or obstetric nurse. The vast majority of midwives now practising have received no training in their work. Though no doubt able to manage a normal case more or less satisfactorily and as the result of practical experience capable of recognizing some of the glaring danger signals of obstetrics, the importance of surgical cleanliness in their hands, their apparatus and their patient cannot in the absence of the essential systematic instruction and training be impressed upon their minds. The procedure which in a trained nurse becomes an automatic action, is apt to be regarded by the ordinary midwife as a useless fad.

There is little prospect of immediately overcoming these difficulties because the majority of the present midwives will probably still be on the register twenty-five years hence. Adequate supervision of midwives by competent trained nurses and their personal instruction by the latter may overcome some of the outstanding defects, but it will not eliminate them entirely.

Much could be done by the medical profession in encouraging the trained nurse instead of placidly accepting the untrained midwife.

It is comparatively easy to criticize the medical practitioner and the midwife for their shortcomings, but it must be remembered that both in great part are products of their training. Again, the medical practitioner may be placed in circumstances where, with no hospital accommodation available, he has to face alone an obstetrical emergency of awe-inspiring magnitude.

No matter how well he may manage such an emergency, it is nevertheless bad midwifery if the complication could have been foreseen and thereby forestalled. It has been truly said that most mistakes in medicine are made not on account of not knowing, but because of not looking and it is from improvements in this direction that we may anticipate progress in the future.

As the quality of the professional work of both the medical practitioner and the midwife depend to a large extent upon the training they have received, it is desirable to examine this aspect of the question in order to discover any avenues affording scope for improvement.

#### *The Training of the Medical Practitioner in the Principles and Practice of Obstetrics.*

From the year 1869 when the General Medical Council of Great Britain first included midwifery as a necessary subject of the professional curriculum, until the present day, the training in this branch of medical knowledge has been periodically remodelled.

The result has been a gradual recognition of its importance, but it is only within the last few years that midwifery has ceased to be looked upon as the Cinderella of the medical curriculum and has assumed its rightful position of equality with medicine and surgery.

The reason underlying this attitude is not very clear, for it must be conceded that a sound knowledge of and practical ability in midwifery is of fundamental importance to every general practitioner.

The young graduate, when faced with an emergency in any branch of medicine or surgery, can hand over his patient without loss of prestige or reputation. In the case of midwifery he is expected to deal with any emergency which may arise, in spite of the fact that his only acquaintance with it is a theoretical textbook knowledge. It is extremely probable that he will not have seen such a case treated by an expert, much less have successfully managed one himself. Any mistake will not only mean the death or at least suffering of the mother, but also the most dire censure of public opinion from which the practitioner, through no fault of his own, may never recover his professional reputation.

The training of the student, therefore, should be thoroughly sound and complete and should embrace all aspects of midwifery, antenatal, natal and postnatal.

The General Medical Council has taken cognizance of this fact in recent recommendations and resolutions in respect of the professional examinations, assigning to the training of midwifery and gynaecology a status not inferior to that of medicine and surgery. The medical schools are today taking steps to put these resolutions into effect. The practitioner of tomorrow will not be able to say that he was taught surgery which he never practised, and that he practised midwifery which he had never been taught.<sup>(33)</sup>

All this is so much to the good, but although our face is turned in the right direction, the end of the road is still far off. It is one thing to lay down minimum requirements of training; it is quite another thing to translate them into practical tuition.

A student may very readily comply with the letter of a regulation, but not with its spirit. Compliance with both implies systematic training, adequate clinical instruction, facilities for hospital experience and ample time in the curriculum for the utilization of the clinical material available. All efforts should be directed to the preventive rather than to the merely ameliorative aspect of midwifery and every endeavour should be made to impress upon the student the necessity for his regarding his activities as a service to the State as much as to his patient.

The student is not being taught midwifery from the standpoint of preventive medicine. It is not sufficient to require mere attendance on twenty cases of childbirth to be got through somehow. There are direct and serious responsibilities resting on the medical practitioner during the antenatal stage, at the confinement and postnatal. The maternal accidents of confinement, the gynaecological conditions following unskilful obstetrics and the infant mortality incidental to childbirth must be prevented. The need is insistent and widely recognized.<sup>(34)</sup>

Australian conditions of training leave much to be desired. The course and standard of training in each of the three medical schools is in accordance with the general principles formulated by the

General Medical Council; in the effective execution of these, however, there are serious defects.

It is only this year (1925) that the first professor of midwifery has been appointed in an Australian University, which is the third largest medical school in the British Empire.

The training in obstetrics is crowded into the background and remains the weakest spot in the whole curriculum. The poor obstetrics of today is largely the outcome of insufficient time given for its efficient teaching. There is an urgent demand for more practical training and better clinical instruction; until this is done there will be no decided improvement.<sup>(35)</sup>

T. G. Wilson<sup>(36)</sup> speaking of the training of Australian medical students states:

Owing to the lack of facilities for carrying out the practical teaching of modern obstetrics, the teaching of this important part of the medical student's curriculum is much the same as it was thirty or forty years ago. In fact, I think that in some ways it is not as efficient. . . . In the gynaecological wards at the [Adelaide] Hospital every year a large number of affections in patients who are admitted for operation or for treatment, can be definitely put down to the results of poor midwifery and many of these ought to be preventable; amongst these cases meddlesome interference bulks largely.

The difficulty seems to be not so much in regard to the systematic lectures which supply the theoretical foundation, but in regard to the opportunities for applying this knowledge and for enlarging it under suitable guidance and expert instruction.

Let us compare the facilities for clinical teaching in the case of gynaecology with that of obstetrics.

Practically every general training hospital has at least one ward for gynaecological patients and in addition an outpatient department of reasonable capacity. Each student is afforded reasonable opportunity for securing sufficient practice in the special form of examination required in this field, whilst the principles of general surgery, already acquired, are amplified in the time he will act as dresser during postoperative treatment. He is expected not only to assist at operations, but to take the necessary clinical histories, to arrive at a diagnosis and to be prepared to justify his work under the clinical cross-examination of one of the teaching staff. Further the patients are adjacent to his routine hospital work; he is always in close proximity and can take advantage of any special or unusual case by noting its whole clinical progress and treatment.

Would a training in gynaecology (or for that matter in any branch of clinical medicine or surgery) which did not involve the taking of case histories or the carrying out of postoperative dressings, be considered as in any way adequate? Yet in the case of obstetrics the student rarely comes into contact with a patient prior to labour and practically never after the birth of the child. His one and only introduction to the patient is, so to speak, *per vulvam* and his evanescent interest in her vanishes with the birth of the placenta.

<sup>1</sup> The word "Adelaide" is my insertion.

It is a great pity that midwifery wards are not a part of the general training hospitals or, if separate midwifery hospitals be essential, that they are not close to the ordinary training school. It would afford an opportunity for experience and tuition to students in emergency and abnormal obstetrics without unduly interfering with their ordinary clinical work. Under present conditions it may happen—in fact does frequently happen—that the student may never see the application of forceps prior to graduation. At graduation, however, he passes into the world sealed with the *imprimatur* of efficiency, certainly in regard to obstetrics, even if not in regard to other branches of medical science.

Up till quite recent years the whole practical experience in obstetrics which the student received was crammed into the space of a fortnight. Lately it has been extended to three weeks in at least one Australian University. During this time the student must attend at least twenty women in labour of which he must personally deliver at least twelve.

It is by no means uncommon for a student to see and to attend only the bare minimum of cases. Some students may have practically all normal cases, others may obtain a more varied experience from the presence of certain abnormalities. To a great extent it is a question of chance and the more students to train, the less opportunity for gaining experience.

Much of the difficulty arises from the fact that the teaching authorities are somewhat handicapped in that only a certain number of maternity beds are available at any one time. Further the available beds have to be also utilized for the training of nurses who, annually, far outnumber the medical students.

To add to the difficulties the greatest possible use has not been made of the available material so far as actual teaching is concerned.

Tutors in obstetrics have not been the rule and it is only in the last year or two that the necessity for them has been definitely decided upon. Even where appointed they are not resident in the hospital, but merely give demonstrations at certain stated times, so that in about twelve demonstrations the student traverses the whole field from pregnancy to instruments. The actual teaching at the bedside is not carried out on the same lines as apply to other branches of clinical instruction. The honorary obstetric staff is a visiting rather than a teaching staff and so far as this does not permit of the continued presence of an experienced teacher throughout a prolonged case, to that extent it militates against efficiency in teaching.

It is to be deplored that no Australian teaching hospital has a resident chief medical officer who may aspire to the standing accorded to the Master of the Rotunda Hospital in Dublin. In practically all midwifery teaching hospitals the student is instructed in practical obstetrics by a sister or matron, occasionally by a resident medical officer, practically never by an honorary surgeon.

Theory, no matter how well taught, can never replace nor compensate the student for a lack of clinical experience. In such circumstances the student's knowledge remains theoretical and, instead of endowing him with the necessary confidence to handle an emergency with coolness and judgement, tends to accentuate and magnify the difficulty in his mind.

Whilst the student is taught practical obstetrics by a nurse whose knowledge the student secretly despises, or by a junior medical officer of limited obstetrical experience, we cannot expect his results in practice to reach the standard desired. The student during his term of practical hospital experience may actually witness the treatment of certain emergencies or abnormalities. There is, however, no clinical instruction on broad lines such as occurs in, say, clinical medicine. He is not asked: "Could this complication have been foreseen; if so, why was it overlooked?" "Should it have been searched for and what steps taken?" Instead, the students merely watch as interested spectators, "with their mouths open like so many oysters on a fishmonger's slab," awed and silenced by the majestic display of skill of which they are not competent judges, and secretly hoping for the day when each will be able to show his prowess under similar circumstances. For in obstetrics, if in no other branch of medical science, it is essential that one should do something.

The actual experience of having witnessed an obstetric operation may even prove detrimental to the student. When he sees an honorary surgeon who has been called to deal with a delayed labour, apply the obstetric forceps with a dexterity worthy of a conjurer, the whole procedure appears extremely simple and of no great consequence. When in addition he sees the child delivered as the result of one prolonged but strenuous extractive effort, albeit with a tear of the perineum reaching almost to the anus,<sup>1</sup> it is not surprising that indifference to the possible dangers characterizes the student's mental outlook.

Having been initiated into the practical application of his knowledge of obstetrics within the wards of the hospital, the student passes to his district cases where he delivers the patients in their own homes. In many respects this is a valuable part of his training. He is brought into contact with patients under the ordinary conditions and surroundings which will later apply in general practice. He is thrown on to his own responsibility and resources and is compelled to utilize the knowledge he possesses. On the other hand, the student usually undertakes his district work after a very limited experience of deliveries in hospital. Here he is not supervised and any defect in technique remains unchallenged. The more frequently these lapses occur, the more readily will they be indelibly stamped on his routine methods.

Whilst he may be absolutely thorough in the principles of asepsis and antisepsis in hospital, his

<sup>1</sup> This was my first and only instruction as a student in the practical clinical application of forceps.



district work is not carried out under the same rigid conditions and tends to convey the impression that the necessity for particular attention to asepsis and antisepsis is by no means urgent.

It will be seen that to a certain extent the very atmosphere of the student's training impresses upon his mind that midwifery is totally different to surgery. Even if the student has to lower his ideal in actual practice in later life, there is no reason why that ideal should not be indelibly impressed upon his mind as a student.

It must be admitted that the "aseptic conscience" is a totally different mental attitude in the field of surgery compared with that of obstetrics. If the student could be trained in obstetrics in the same rigidity of technique as is carried out in the surgical operating theatre and when attending to district cases given every facility to the utmost possible extent of doing there similarly, there is little doubt that he would attain to a higher degree of efficiency in his subsequent obstetric practice than has been the rule hitherto.

Provided that the student be given an adequate training in hospital prior to undertaking district cases, there is no reason why the latter should not be of great value. Under present conditions his district work is liable to counteract the beneficial influence of his hospital experience; for when normal district cases apparently do as well as operative cases which are conducted under the rigid aseptic conditions of a hospital, the student is apt to conclude that operative cases could with impunity be carried out just as successfully under district conditions.

Actuated by such views his results in practice are liable to prove disastrous and there is good evidence to show that it is just this conception that helps to perpetuate the present unsatisfactory maternal morbidity and mortality.

It is quite unusual for a woman to be thoroughly examined before her return home after the birth of her child. Nevertheless it is very desirable that a thorough pelvic examination be made during the puerperium at some time prior to her return to ordinary life. Avoidance of this duty no doubt results in part from a desire to consider the woman's feelings, but the advantages are quite evident and would convince any lay person. In this way many of the diseases which form so much of the gynaecologist's practice and which result from the wear and tear of parturition, may be caught in their earliest stages when they are more amenable to treatment.

"If antenatal care be preventive midwifery, post-natal care is preventive gynaecology."

Neither in hospital nor in the district work does the student pay much attention to the management of the puerperium and yet this is a most important period during which the most grave complication, puerperal infection, may arise. There is little or no clinical instruction in connexion with this period, though the direct and indirect benefit of such instruction to the student for the purpose of

equipping him with sound knowledge in regard to the infant as well as the mother is quite evident.

In view of all these facts it is somewhat peculiar that the representatives of the whole medical profession in Australia should pass the following resolution:

That it be recommended to Congress that the various State Governments of the Commonwealth be asked to appoint boards of control similar to the Central Midwives' Board of England with a view to controlling and supervising midwives and obstetric nurses, so as to protect parturient women as far as possible from the ravages of septicæmia.<sup>(36)</sup>

The outstanding defect in the training of medical students will be seen to be associated with the lack of opportunities for practical instruction in the hospital. This essential clinical teaching implies not only up-to-date hospitals but an adequate teaching staff, so that students may obtain as much detailed instruction in obstetrics as is proportionately given them in medicine and surgery.

It is absolutely essential for teaching purposes that the hospital should have both out-patient and in-patient departments for each of three classes of patients, the pregnant woman, the woman in labour and the mother and nursing.<sup>(37)</sup>

Passing reference has already been made to the necessity for more specialized teaching by the medical staff of hospitals. An all-round staff is required so that all honorary obstetric surgeons shall take an active part in teaching. The endeavour should be to transfer to the obstetric wards the same relations that exist between teacher and student in the medical and surgical wards. In the latter the relationship is direct and personal; in the former there is every probability that the student will rarely come into contact with any of the honorary staff. There should be one (or more) senior resident medical officer whose duty should be to act continuously as tutor to the various groups of students who pass through the hospital, and an adequate salary for this post should be offered not only to obtain the best man but also to encourage him to specialize in this work and to remain on the staff for a reasonable period. An efficient pathological staff under an expert departmental head is also desirable. This staff should include a biochemist who would find an untrodden field for research, particularly in connexion with the toxæmias of pregnancy and the puerperal state. Investigation and knowledge in this field are urgently required and no more suitable place could be found for this work than in a hospital utilized for the training of students.

It is along such lines as these that we must proceed if we intend to remove the reproach that one can afford to be contemptuous of defective skill and technique in surgery, but an equivalent deficiency in obstetrics carries no scorn.

Training in antenatal care and treatment represents the practical consummation of preventive midwifery. For this reason its consideration has been left until this stage, though it may reasonably have been anticipated somewhat earlier.

Consideration of the organization of antenatal clinics, their merits and advantages will be discussed later. Here it is only intended to deal with the necessity for the efficient training of medical students in the principles and practice of antenatal care and management of the prospective mother.

There can be little argument against such training, but up to the present any instruction has been fortuitous and voluntarily undertaken when it should have been accurately systematized, comprehensive and compulsory.

The system in vogue at the Tarnier Hospital, Paris, is an excellent one. A large ward is used for this part of the work. Each examining couch is screened and to each two students are assigned. The student takes the history, makes a general examination, carries out abdominal palpation, measures the pelvis and arrives at a diagnosis. This diagnosis will relate to such factors as the period of pregnancy, the presentation, position and engagement or non-engagement of the presenting part. After being checked by a clinical assistant, the responsible medical man in charge of the clinic at a definite time discusses the case, points out special features and makes any further investigation which may be necessary. Adequate instruction to the students without worry to the patients is thereby achieved.<sup>(32)</sup>

Instruction in antenatal care and management has so far not assumed the importance in the curriculum which it deserves. It is essential that each student should be impressed with the necessity for the antenatal care of every pregnant woman and particularly if the latter is a *primigravida*. First confinements involve the greatest risks, especially from eclampsia and difficult labour with or without subsequent sepsis. The necessity for antenatal care and treatment is evident in these cases, if we are to eliminate those detrimental but controllable factors which can be anticipated and foreseen. This is the safest and most satisfactory method for the avoidance of those catastrophes which can be readily controlled in an early stage of their development, but which so frequently prove to be formidable or fatal when unperceived until late in pregnancy. Such instruction would afford excellent opportunities for practice in diagnosing early pregnancy and for teaching the student how to combat those minor discomforts and indispositions which make pregnancy for many women a period of marked disability.

The student would be taught the value of abdominal palpation and the necessity for gaining skill in this direction rather than to rely entirely on unnecessary and dangerous vaginal examinations for his information regarding the progress of labour.

Opportunities to rectify malpositions or malpresentations would be available and the student would be impressed by the practical demonstration that prevention in midwifery as elsewhere is better than cure.

The dangers of venereal infection in relation to midwifery will be clearly seen and the efficient

treatment of this condition in the interests of both mother and child impressed upon the student. In consequence of this training pregnancy will assume in the student's conception an importance which it would otherwise not possess; instead of being merely regarded as an indispensable preamble to parturition, he will learn to regard it as a wonderful opportunity for the elimination of unexpected emergencies at the time of delivery.

The instruction in this branch of study given up to the present to medical students, is not so much a training as an introduction to the latest idea in midwifery practice. The student may realize the desirability of such action, but he is not definitely told of its paramount importance and absolute necessity. If such were the case we would not find that the majority of mothers receive practically no supervision during pregnancy or that the supervision extended to the majority of women who are fortunate enough to have some prematernal care, consists generally of one examination of the urine late in pregnancy.

The medical curricula of the Australian Universities do not stress the importance of antenatal study and the average tutorial practical training that the student is likely to receive, is one or two hours' tuition. Surely this cannot be regarded as adequate training in a field which offers such opportunities for real preventive work in midwifery.

Since by antenatal care and treatment we can not only prevent many of the complications of pregnancy and labour, but also reduce operative interference to a minimum, we have the means, if we but use it, to eliminate much of the present puerperal septic infection and to bring about a reduction of our unsatisfactory morbidity and mortality rates from other puerperal causes. If we are to be successful, we must so train our students that future practitioners will regard knowledge and skill in dealing with emergencies as less meritorious than the application of these attributes to their prevention.

On a more thorough training of our students along these (antenatal) lines lies our hope of reducing puerperal morbidity and mortality from obstructed labour and from untimely and unnecessary interference with normal labour, from the toxæmias of pregnancy and from hæmorrhage. The necessity for antenatal care and supervision is coming to be recognized by a large part of the community. Its universal adoption can only come through the effort and example of the whole body of medical practitioners thoroughly trained in its details.<sup>(33)</sup>

#### *The Training of the Midwife.*

The midwife does not play such an important part in the field of midwifery in Australia as does the midwife in England. It has been shown that at least since the passing of the *Maternity Allowances Act*, the local midwife has been gradually ousted from her position of being solely responsible for the confinement and has assumed the subordinate office of assistant to the medical practitioner (see Table VII.). In England midwives attend more than half of the total number of confinements on their own responsibility, merely calling in a medical man when they meet with difficulties.

If the contentions previously put forward be sound, the midwife is not so responsible for our unsatisfactory maternal mortality as is customarily held; nevertheless she is certainly a factor even though not the principal factor and it is, therefore, necessary to consider whether her training be such as to make her satisfactorily capable to carry out her important duties.

The scope and length of training formulated under the various *Midwives Acts* in force in the individual States are, at least in their aim, quite satisfactory.

The subjects laid down in each curriculum are comprehensive and the time to be spent in acquiring the necessary knowledge is usually twelve months.

There is little doubt that, if the actual practical training were as thorough as the intention of the various regulations would lead one to assume to be necessary, we would have a better type of midwife than is the case at present. The vast majority of the midwives in actual practice have been registered in virtue of their having been in practice prior to or at the time of the passing of the various acts. Few of these midwives have had any real training; their knowledge is empirical and rule-of-thumb; their tuition was received at the hands of some previous midwife who was no better equipped than her pupil. It will be many years before this type can be replaced by a more efficient and well trained successor.

Theoretically the curriculum and the controlling regulations of the various *Midwives Acts* should produce such successor. In actual practice this is not eventuating.

The reasons underlying this anomaly are many. Although it is becoming a more frequent rule for the hospital trained general nurse to undertake the additional six months' training in order to obtain her obstetric certificate, the number of such trainees is not sufficient adequately to replace the usual type of midwife. Further, many of these nurses obtain the obstetric certificate chiefly on the ground of post-graduate instruction and have little or no intention of actually entering practice as a midwife. Even if such a nurse decided to practise, she would be faced with the difficulty of competition with her untrained and cheaper sister and economic considerations frequently compel the medical practitioner, probably against his better judgement, to support the latter.

There is another type of trainee who completes the twelve months' curriculum in a midwifery training hospital and after obtaining her certificate, registers as a midwife and commences practice. Though necessarily not so capable as the doubly certificated nurse, this type would be a great advance from the present position if only she could be supplied in adequate numbers.

In those States where the *Midwives Act* has been in force for some ten or fourteen years, it is found that the midwives registered and in actual practice in virtue of having been in practice at the time of passing of the act, tend to become fewer in number. This is, of course, due to the retirement or death of a certain number each year.

Here is the opportunity, one would imagine, to replace the deficiency by the type of trainee under consideration. Unfortunately the training hospitals cannot supply the demand, at least in certain of the States, if not in all. The training hospitals are comparatively few in number and hence the output of trainees is limited. To train more nurses necessitates more cases and it is at this point where the difficulty arises.

At least one effect of the maternity bonus has been to bring into existence in some States a large number of small maternity homes, euphoniously termed private hospitals, managed in the vast majority of instances by registered, though untrained midwives. The fee for confinement in these homes is generally below, certainly rarely higher than that usually expected in a public maternity (training) hospital. In consequence a great many mothers prefer to be confined in a "private" rather than in a "public" hospital and as it usually costs no more, one can appreciate their point of view.

The result is that all the patients so treated are lost for the purpose of training nurses and the position will probably become more acute as time passes.

I can speak authoritatively in regard to at least one public maternity hospital, the principal training school for a certain State, which for the reason just mentioned was recently faced with the prospect of closing its doors and appealed to the medical profession to encourage patients to take advantage of its facilities. The dearth of patients was due entirely to the fact of competition of "private" hospitals, as the universal consensus of medical opinion is that the hospital is efficiently and capably managed in every way.

This dearth of patients with its consequent diminution or at least lack of increase of trainees, will sooner or later necessitate the recognition of certain private maternity hospitals as training schools. Even now the need for this exists and in at least one State it has been necessary to countenance the practice.

Further, in the less populated States it is impossible to arrange for the training of midwives entirely in the larger centres and in consequence the course of lectures and practical training are given as capably as local conditions will allow. This is not an ideal arrangement and does not tend to raise the standard of training, but it is often the only means of supplying a district with a resident midwife, thereby eliminating the untrained handy woman.

The whole circumstances interact in a vicious circle, the outcome of which is certainly not the replacement of the "Sarah Gamp" type by an adequate number of well trained and efficient substitutes.

It seems to me that apart from the main centres of population the training of midwives is extremely difficult and where attempted is generally unsatisfactory. The period of training is satisfactory where the trainees can be highly selected as in a city training school, but is it sufficient for the rank and file? Considering that it requires some two to



three years before a general nurse becomes reliably proficient in aseptic and antiseptic technique, can we reasonably expect the same efficiency with twelve months' training from one who has not usually had even an equivalent preliminary education? And yet such efficiency is to be expected, unless we subscribe to the dangerous doctrine that it is not so important in midwifery as in surgery.

I am not advocating that the ideal midwife is the general trained nurse with an additional obstetric certificate. This is not necessarily so. The obstetric trainee, however, has so much to learn in a comparatively short time that attention is necessarily focussed on the main incidents and especially the labour itself. The necessary duties antecedent and subsequent to the latter are apt to assume a lesser significance in her eyes, whereas they should be regarded as of equal importance to the actual labour.

It is, I think, impracticable even if it were advisable to increase the training beyond the present period, but the necessity for utilizing such time to the greatest possible advantage is evident.

The question of antenatal care is not dealt with very thoroughly in the training of midwives and yet the latter could be of the greatest assistance, if only they realized its value, in persuading the mother to place herself under the supervision of a medical practitioner. There is no reason why she should not undertake the periodic examination of urine and report to the medical practitioner who is advising the patient. The midwife ought to be and would be if properly acquainted with her duties and responsibilities, a cooperator with, rather than a competitor of the medical practitioner.

It is very probable that one's horizon becomes bounded by outstanding defects; for this reason one tends to judge the whole question of the training of midwives in terms of the untrained or at least the less educated midwife.

To obtain improvement in the present position we require an ample supply of intelligent and capable women who will become the midwives of tomorrow, so that they will replace the untrained midwives whenever possible.

For many reasons, several of which have been indicated, we are not near the solution of this difficulty.

A factor which has not been touched upon but which is important, is the economic one. There are many more attractive avenues of employment than that of midwife open to women. The work of the busy midwife is onerous and poorly remunerated; hence for the most part she is to be found in the larger centres of population where a living is most readily obtained, so that there is no encouragement for a superior class of prospective trainee to undertake the necessary training.

This could be overcome by improving the status of the midwife and with it her remuneration. Unfortunately, this is not possible under ordinary conditions; since an increase in nursing fees would drive many women into the hands of the unregis-

tered handy woman under the guise of "emergency," whilst a certain number of women may be placed in difficulties for attendance.

If the respective Governments would subsidize midwives by paying for their training and guarantee a certain income if resident in localities selected on account of isolation, or other special needs, it is very probable that many desirable women would undertake the training and make the work their life's career.

In my opinion a certain small portion of the present maternity bonus, if expended in this direction, would produce much more benefit than has accrued so far from its expenditure.

There is one method by which the existing service by midwives could be improved. Periodic courses of instruction for all registered midwives offer in my opinion a valuable means of raising the standard of midwifery practice. In certain European countries such "refresher" courses are compulsory under the law which regulates the registration and controls the practice of midwives. These courses have not been instituted in any Australian State and under the existing laws could not be made compulsory. It would not be practicable to bring country midwives to the larger centres, but convenient meeting places could be arranged from time to time. Here again the question of finance arises because compulsory attendance at a distance may mean a loss of practice and personal expenditure which can ill be afforded.

Although there seems little hope of obtaining the necessary expenditure for such a scheme, there is little doubt that it would be productive of much good.

#### *The Obviation and Prevention of Obstetric Disasters.*

In discussing the causes of maternal mortality it has been necessary in many instances to refer to the obvious or implied measures for their prevention.

It is now proposed to discuss somewhat broadly the various means of preventing the morbidity and mortality which is liable to arise during the antenatal, natal and postnatal periods. Of all preventive agencies which give promise of beneficial results, there can be little question concerning the potentiality of one which so far has not yet received the recognition and certainly not the support which it deserves. This agency is antenatal care and supervision.

(1) *Antenatal Care.*—Antenatal care and attention was first advocated in 1900 by Dr. J. W. Ballantyne,<sup>(39)</sup> in response to whose appeal there was endowed in the Edinburgh Royal Maternity and Simpson Memorial Hospital the Hamilton bed, the first of its kind to be set apart in any hospital for the treatment of the various morbid conditions of pregnancy.

Comparatively few of the public maternity hospitals in the Commonwealth have as yet placed the antenatal clinic on the footing that it should occupy. Such hospitals and even those with only a maternity department could afford admirable facilities for the

work. They are in a position to win the confidence of the expectant mother at the earliest period of her pregnancy and to extend to her the best antenatal attention when such is required. The plea for getting patients under treatment in the earliest stage of their disease must be extended to the temporary disability of childbirth. It is a peculiar anachronism that we deplore the late period when the tuberculous patient comes under notice, in spite of the fact that this disease is notoriously insidious in onset, and yet with months of actual knowledge of each individual case we have not so far endeavoured to treat parturition on a preventive basis.

In the larger centres of population the prematurity or antenatal clinic would have a marked value for both undergraduate and postgraduate training in a branch of obstetrics which up to the present has been if not neglected, at least relegated to an unimportant position in the curriculum. Here the student will be taught the observation and care of the pregnant woman and will for the first time in his career see patients who are not ill and will be instructed as to the best means for keeping them well. He will learn to appreciate warning signs and danger signals and how to forestall preventable difficulties. The actual birth itself will assume a different proportion; instead of being considered as the alpha and omega of the whole position, it will come to be regarded as merely the fruition of the whole reproductive process, which has been supervised up to this stage and which still demands special care for even some time longer.

The conviction that many potential dangers and a considerable number of deaths at the time of confinement are due to causes which were acting during the preceding nine months of pregnancy has been slowly but surely dawning on the minds of medical practitioners. That most of these causes or at least their evil effects may be eliminated by antenatal care has as yet been recognized only by the few. In one case it is the mother herself who suffers from the lack of medical care during pregnancy; in another it is the child; whilst in far too many cases both mother and child become a sacrifice on the altar of neglect.

Statistics in connexion with antenatal work in the Commonwealth are not readily obtainable. The numbers of women receiving antenatal care in the large hospitals are so few that it is impossible to utilize them as an index of the health of pregnant women in the general population.

In the year 1922, 869 pregnant women attended the antenatal clinic at the Royal Hospital for Women, Paddington, Sydney.<sup>(40)</sup> Of this number 145 or 17% showed abnormality demanding treatment or supervision. However, there were no maternal deaths among the abnormal pregnancies.

Statistics of the Royal Hospital for Women show that antenatal treatment of albuminuria of pregnancy will prevent the onset of eclampsia in the great majority of cases and in the small minority of treated women in whom eclampsia supervenes the disease is mild. In the last

seven and a half years we have had 615 patients with albuminuria of pregnancy under treatment in hospital. Of these, only seven developed eclampsia and all recovered. . . . During the period 1911-1915 there were 123 patients with eclampsia, a ratio of one case of eclampsia to 62 confinements; whereas during the period 1916-1923 there were 158 patients with eclampsia, a ratio of one to 81 confinements.<sup>(41)</sup>

The improvement was considered to be due to the increasing attendance and popularity of the antenatal clinic. These figures do not allow us to form any idea of the prevalence of abnormality amongst pregnant women in general. That pregnancy is frequently abnormal there is little doubt, but as to its exact or even probable prevalence no definite statement can be made.

It was found in Scotland<sup>(42)</sup> that of the women attending antenatal clinics, only 54% were normal. This seems to be higher than what we might expect in Australia even among hospital patients, but the frequency of complications of pregnancy can be realized from this statement even though the actual rates in the two countries eventually show a marked disparity.

It may be mentioned in this connexion that in Glasgow where antenatal clinics have been in operation for some years, only about one-seventh of the total pregnant women avail themselves of the advantages.<sup>(10)</sup> No trustworthy comparisons can therefore be drawn between Scotland and Australia regarding the frequency of abnormal pregnancy.

Antenatal supervision will eventually be regarded as the key to success in preventive midwifery; meanwhile it is essential first to convince the medical profession and through the latter the individual mothers of its indispensable necessity. Until such supervision is regarded by both doctor and patient as a first principle of midwifery, we shall not be able to bring about the reduction of maternal morbidity and mortality in those directions in which the latter are most preventable.

In recommending the establishment of antenatal clinics it should be borne in mind that their influence will extend beyond the mother. They really represent the aim of child welfare and baby health centres carried to its logical conclusion; because by caring for the pregnant mother you are really caring for the child prior to its birth, thus increasing its chances of survival beyond the deadly first month and the succeeding perilous eleven months of its life.<sup>(42)</sup>

We owe three duties to every expectant mother who entrusts herself to our care; they are frequent and regular examination of the urine, a detailed obstetric examination (especially of every *primigravida*) in the early months of pregnancy and a detailed obstetric examination of every woman whether *primigravida* or *multigravida* in the last few weeks of pregnancy.

It is so much easier to prevent by these means many difficulties which are liable to be met with during labour, than to escape from them when the labour is advanced, that it is difficult to understand

why this obvious fact has not so far been acted upon.

If it be true then as it undoubtedly is, that of the number of deaths directly due to pregnancy and labour the greater proportion could be prevented, the scantily diminished yearly mortality constitutes a standing reproach to the community and to the medical profession and, in particular, to the teachers of obstetrics. The remedy lies in nothing less than a radical change in the conception of midwifery both by the profession and the public and a complete revision of the attitude of thought that dominates the teaching and practice of the art.<sup>(40)</sup>

The advantages to be derived by a patient from antenatal supervision and care at the hands of a competent medical practitioner may be summarized as follows:

1. The removal of anxiety and dread from the minds of expectant mothers and instruction regarding the best preparations, in view of all the circumstances, for the birth of her child.

2. The removal of much discomfort, amounting in many cases to actual suffering, from expectant mothers.

3. Opportunity for the early and effective treatment or control of such conditions as toxæmias, venereal disease, miscarriage, heart disease *et cetera*.

4. It will lead to an increase in the number of normal labours. By securing the removal to hospital before labour of those cases which do not offer a reasonable prospect of satisfactory confinement at home, delivery by forceps or other operative means can be reduced or at least undertaken under suitable conditions. If "forewarned" be equivalent to "forearmed," arrangements can be made in ample time for medical aid for those cases whose indications are that they will probably need it.

5. It will definitely lessen the stillbirth rate.<sup>(42)</sup>

6. A fall in the maternal mortality rate and a decreasing amount of morbidity from such causes as sepsis, hæmorrhage, embolism, pelvic abnormalities and the like may reasonably be anticipated.

Examination and advice, though perhaps most important, will be of little benefit unless every patient who needs it, can obtain treatment. This will necessitate in many cases hospital beds where the patient will receive the necessary indoor observation and treatment. Hence the prematernity ward has been gradually growing as an adjunct of the ordinary maternity hospital. Prematernity beds will be more fully recognized as essential as time passes. In them may be treated those expectant mothers who are suffering from one or other of the maladies of pregnancy and who are carrying infants about whose live birth there may be grave fear. Preferably these beds should be quite distinct from the ordinary maternity bed and maintained entirely for their specific purpose. It is desirable to keep the expectant mother apart from the nursing mother; she requires different food, different nursing and different medical attention.

In most instances the expectant mother will return home after treatment and may be delivered there. Should labour supervene whilst she is in

the prematernity bed, it is a simple matter to transfer her to the lying-in ward.

The advantages of such a system far outweigh the disadvantages of indiscriminately mixing expectant and nursing mothers.

It will be seen that the ideal organization will comprise the antenatal (or pregnancy) clinic coordinated with, if not forming a part of the prematernity ward.

It is desirable that each scheme should be in charge of a medical practitioner thoroughly competent in obstetrics, who will arrange the work with colleagues as well as himself visit at certain stated times.

A nurse, trained in midwifery and preferably also in general nursing, should be permanently attached to the centre. Her duties will be to see to the general running of the scheme, to ascertain that the mothers understand the instructions given, to issue suitable literature and especially to visit the mothers in their own home. This home visitation will enable the nurse to ascertain the extent of the preparations for the anticipated confinement and the steps which have been taken by the mother to secure her own health in accordance with the directions given to her.

Additional assistance to aid in the preparation of patients for examination, the testing of urine and the keeping of records could be provided by pupil midwives who would derive great benefit from the experience which should form an important part of their training.

Any expectant mother should be made to feel that her attendance will be warmly welcomed. There is no need, however, for the clinic to act as a competitor with the regular medical attendant.

When a mother has engaged a medical practitioner, she should only be attended with the full agreement of the latter and in this case he should be given all information as to clinical findings which are available.

These clinics will require neither great expenditure nor any important alteration in existing organizations. When coordinated with the prematernity ward and through this to the maternity hospital they will form a link in the chain of preventive midwifery which can be adjusted in any direction dictated by experience. They will form the advanced line of defence in the campaign against maternal morbidity and mortality—"listening posts for the recognition of the slightest whisper of danger"—where pupil midwives and most important, medical students will receive an essential part of their training.

It is very probable that these clinics will also become an extremely important aid in the control of the ravages of venereal disease in so far as the latter affects the expectant mother. It is a well recognized fact that the facilities available for the treatment of venereal disease are not utilized to any extent by women who, if treated at all, are only treated through indirect channels, chiefly when they are brought under notice for some remote



manifestation of the disease. Considering the harvest of antenatal mortality reaped by syphilis and the potentiality for evil of gonorrhœa not only in the production of sterility, but also by acting as a precursor of serious complications of labour and the puerperium, there can be little argument against the advisability of utilizing the antenatal clinic as a means to check in selected cases these maladies before they have wrought their worst effects.

Restriction of these antenatal organizations by any specialized or confined administration will be fatal to progress. They should be closely coordinated with other agencies, so that unnecessary overlapping and expenditure on superfluous duplications may be avoided. There is often a tendency for each organization to carry out its work in a "water-tight" compartment, whereas the real aim is to attend to the mother and through her to the child from the latter's conception or shortly afterwards up to the time of its birth and by suitable coordination with other organizations to pass the child on to the latter.

By such means the child will obtain adequate supervision throughout infancy until it commences at school, when it will be brought under the influence of the school medical service.

Any hiatus between one agency and another demands adjustment; it is an index of defective organization and a measure of inefficiency.

The linking of maternity hospitals, maternity centres (antenatal, natal and postnatal), baby health centres, health authorities and all other allied agencies into one cooperating whole is necessary for the ultimate control of this vast territory of life. There is no necessity for a stereotyped homogeneity of action, but an intensive coordination is eminently desirable.

(2) *The Control of Midwives.*—The control of midwives in regard to their training as well as in their actual work is an important factor to be considered. In other sections of this essay it has already been referred to and it is only necessary here to emphasize certain facts in connexion therewith.

In the administration of the acts which control midwives in the several States, there has been a tendency to reduce the cost of administration to a minimum. On this account comparatively little is done in the way of supervision and instruction; in fact the acts have so far been of little real benefit. Apart from exacting a registration fee, publishing a list of registered midwives and in the event of a case of puerperal infection arising in a midwife's practice suspending the latter from practice for a certain time, practically nothing further is done.

The supervision of the actual work of midwives should be in charge of a competent nurse who has been well trained in both general and obstetric nursing. This supervisor should have the necessary assistants, so that all midwives are brought under control. With the supervision should go hand-in-hand a patient and continuous instruction. By arousing their interest in the latest developments of

maternity nursing, infant hygiene and allied matters having a bearing on their practice, a better appreciation of their duties will be instilled into their minds.

Lectures both by the supervisors and by medical men would be extremely beneficial; informal talks would tend to gain their confidence and the midwives would become accustomed to utilize such meetings for the exchange of views and for the discussion of difficulties which they have met.

Most of the States possess an *Early Notification of Births Act* which could be of great value. For the most part these acts are utilized for the purposes of infant welfare, since they afford the welfare nurse an opportunity to advise the mother in regard to the feeding and care of her infant. The information obtained could also be used in connexion with the supervision of the midwife's practice. In some of the States this method is adopted in certain centres, but the importance of the infant welfare work overshadows that of the supervision of the midwife.

Until we obtain a more highly trained and efficient successor to the present ordinary type of midwife (and as previously mentioned this will not occur for some years at the earliest) much greater efforts should be made to overcome the existing defects. There is a possibility that with the passing of the present untrained but registered midwife, we shall obtain a more satisfactory type of obstetric nurse. It appears, therefore, that any control should be exerted now rather than in the future.

The supply of desirable successors to the present midwives is an extremely difficult problem. The training hospitals for several reasons are not able to train midwifery nurses in any great numbers; some of those who are trained, do not necessarily take up the work; if they do, they may practise in a locality which is already well supplied with nurses, whilst other centres are left to the untrained woman.

There is little doubt that in country districts the supply of trained midwifery nurses is by no means ample. This is partly accounted for by the sparsity of population and the consequent difficulty for a midwife to live from the proceeds of her work and partly by the fact that an unregistered woman, provided she works under the direction of a medical man, can act as midwife. This latter event unfortunately occurs far too frequently. The result is that a competent nurse cannot settle in the district, whilst a bush nurse maintained by local effort and subscriptions, is apt to be regarded by many medical practitioners as an "undercutting" competitor.

Subsidization of the training hospitals in proportion to the number of trainees would certainly be beneficial in some States, if not in all. It would perhaps offer an inducement to extend facilities for training or the money could be allocated for the specific purpose of increasing the accommodation and therefore the facilities in the hospital for training.

The practising midwife could be assisted to carry out her work efficiently by the health authorities undertaking to provide packages containing sterile wool, pads, dressings and the like at the lowest possible cost. By purchasing in large quantities the cost to the individual midwife could be considerably reduced and this would tend to encourage the use of sterile dressings rather than any material which happens to be at hand.

Where a midwife is willing to reside in a district which is otherwise not served, and which cannot be expected adequately to remunerate a resident nurse, it would be an excellent idea to offer some inducement in the form of a subsidy to the midwife who will settle there.

#### *Investigation and Research.*

Although a notification of puerperal infection may lead to a certain amount of inquiry by the health department concerned, there is no detailed investigation of the case.

Should the case prove fatal, it is probable that the department will not ascertain this fact, whilst maternal deaths from other causes will never come under notice except in the form of statistics. Should any action be considered necessary, it is almost certain that this will be in the direction of controlling the midwife and involving her temporary suspension from practice or her disinfection. The slight value of notification has been pointed out and it will be seen that only a small proportion of the total cases of puerperal infection will be brought under notice. Comparatively few of the midwives implicated will under these circumstances be subjected to any measure of control, whilst the large majority of all midwives will rarely be brought into contact with the central authority.

The desirability of having all such investigations carried out by a medical officer of health has previously been stressed. Only a medical man can elicit the necessary facts and can assess their value. Even though certain aspects of the investigation be delegated to a subordinate, for example, a nurse, the whole of the facts should be finally considered by the medical man.

Personal investigation by the medical officer of health is essential in any case where the patient has been treated by a medical practitioner, since the latter would justifiably resent questions from any person other than a colleague of equal professional status. This personal and close association between the health department and the practising medical profession would eventually bring about a very desirable cooperation. Apart from the actual assistance in the form of nursing or hospital treatment which the department could probably give to the individual patient, the information gained would prove invaluable for future guidance in the prevention of any similar recurrence.

If statistics are to be of value they must be compiled on a basis which is not only accurate, but sufficiently comprehensive to include special information which will be of practical use.

The necessity for maternity and gynaecological hospital statistics being compiled in a comprehensive and uniform manner is an outstanding one. At present one cannot obtain much information and that which is obtainable in one institution, is usually not comparable with that obtained from another similar institution. This could be arranged by means of subcommittees and subsequent conferences in the various large hospitals; in fact the medical profession might lead the way in conjunction with any scheme for the standardization of hospitals along the lines suggested in America.

The information would throw light on many questions and would help to elucidate many of the causative factors concerned in maternal and foetal mortality, as well as forming a standard or norm with which to compare midwifery practice and results.

The allied matter of the certification of the causes of death is likewise extremely important. The certificate of death is the starting point of a large portion of vital statistics. The causes producing the fatal issue should be stated in a more efficient, detailed and scientific manner than is the case at present. The insertion of such a cause of death as "prematurity of birth" is correct in one sense, but in another is most misleading. One feels certain that behind this other causes have played their part and the mere statement of a final result does not get us any nearer to the actual cause or causes. Many causes of death are stated which are cloaks for ignorance, and useless both to the statistician and the health officer.

The desirability of having pathological research conducted in the large maternity hospitals has been mentioned in connexion with the training of medical students. The need of definite information concerning the actual causes underlying the morbidity of pregnancy is universally recognized; in fact investigation in this field is so urgently required as to justify its national financial support. We are comparatively ignorant of the physiological and pathological relationships existing between the mother and her unborn infant. The healthy mother does not necessarily imply the healthy child and until the reactions of one to the other are fully ascertained and definitely set forth, we cannot expect to advance far from our present position.

The physiology of pregnancy is by no means accurately determined, whilst the causes underlying abnormal development of the foetus is virtually an untrodden field of research. We have only touched the fringe of such problems as the interchange by way of the placenta of food, gases, excreta, hormones and so forth between mother and child and *vice versa*.

We know from practical experience that the foetus in certain cases acts as a dangerous source of pathological intoxication for the mother, but concerning the reasons why one foetus acts thus, whilst the majority remain innocuous, we are in complete ignorance.

The effect on the foetus of drugs administered to the mother, its reaction to such drugs and the

possible results of such reaction in turn on the mother is an inquiry awaiting investigation.

Even the incidence of latent syphilis, a most potent cause of maternal invalidism and infantile mortality, has not yet been satisfactorily determined for Australian conditions. An extension of the work carried out by Fairley and Fowler<sup>(44)</sup> (45) (46) to enable if possible a definite pronouncement on the causation of abortion and stillbirths would be invaluable and would probably give the medical profession definite guidance in the care of their patients with a view to the prevention of miscarriage.

In spite of our knowledge being in many respects inadequate, there is no need to postpone the prevention of maternal morbidity during pregnancy until all the problems in this field have been scientifically elucidated. We can do a great deal for the mother and there is ample evidence to show that at least the morbidity of pregnancy can be reduced, ameliorated and prevented by suitable medical means.

#### *Educational Propaganda and Social Endeavour.*

Education of the public is one of several means to the end in view and will involve the cooperation of governments, health departments, medical and nursing professions and other allied agencies. Educational effort cannot be expected to produce immediate results. It has to fight its way against the vested interests of tradition and custom and nowhere perhaps against greater odds than in the sphere under discussion. The customs and mental attitudes handed down from mother to daughter through several generations are not to be transformed by a spasmodic or localized effort. The change, if brought about, will result from education and propaganda, broad in conception, individual in incidence and prolonged and persistent in time. Whilst the most minor surgical operation impresses the general public with feelings of awe and wonder, the much more serious, in many instances surgical operation of childbirth causes not the slightest flutter of the imagination. The result can be seen in the public's valuation of the service rendered. They "want it cheap, even if not nasty." If the labourer be worthy of his hire, surely the obstetrician is as much entitled to an adequate remuneration as is the surgeon for the average minor operation.

It is essential that the mothers themselves should be made to realize the necessity for placing themselves under medical guidance as soon as they are aware that they are pregnant.

A compulsory notification of pregnancy is impracticable and undesirable; we must therefore reach the goal by means of persuasion. The conviction that it is in their best interests to obtain and to follow medical advice at the earliest possible moment, can only be given to mothers by some method of informative education. We have had experience of this method in the existing arrangements for the control of infantile mortality, so

that at the present time the majority of individuals realize the necessity for the proper feeding of infants. This result has been achieved only after many years of educational effort and the provision of facilities for the obtaining of advice. The process is by no means complete, but there is little doubt that it has proved beneficial.

If mothers can be taught that their children require special care and attention, we may surely rely on being able to impress upon them and their husbands the greater urgency of safeguarding their own lives.

But this implies a broader conception of his duty by the medical adviser than is at present current. So long as the medical practitioner is not thoroughly trained in and does not practise preventive midwifery, much of the education which should come from him, is wanting. This defect may be overcome in the future practitioner by the better training of the medical student and in some of the present generation of practitioners by postgraduate study.

The isolated position of midwifery is early brought to the notice of the medical student. His textbooks of physiology do not deal with the function of reproduction; the diseases and disasters of childbearing receive no mention in the lectures on general pathology; the obstetric curriculum is divorced from the rest of his studies as though the morbid processes with which it concerns itself, were fundamentally of a different nature to the rest of disease. He sees in some institutions its exponents, though styled physicians, practising their calling almost entirely by operative means. In the theatre attached to the lying-in wards he witnesses labour conducted with the circumstances of modern surgery, whilst in the externe department he finds the same procedures carried out under conditions which would make any of the operations of recognized surgery unjustifiable. He finds that at the London University the M.D. degree may be taken in obstetrics and that an essential feature of the examination is a paper not on surgical pathology, but on general medicine including tropical medicine.

What wonder, then, if in the face of these anomalies and contradictions, a conception of midwifery as a separate art to which the tenets of surgery only partially apply, grows up within the student, from him passes on to the practitioner and finally reaches the public. . . . The analogy between reproduction and other natural acts has been so much harped upon that the public has come to think little of the dangers of pregnancy and labour, the latter of which amongst the uneducated classes is regarded as analogous on a larger scale to defecation or micturition. These two errors are responsible for maintaining great public ignorance of the necessity for proper supervision during pregnancy and prearrangement against the time of labour and as a corollary, a disinclination to spend on these events an amount of money commensurate with their importance.<sup>(46)</sup>

It is desirable that the education of the public should be carried out through every available channel, the most important being the individual medical practitioner. Only he is conversant with the real significance of the facts and can convince the individual women with whom he comes into professional contact, in regard thereto and from whom it will spread to others.

A certain amount can be done by means of printed leaflets distributed through health departments. Unfortunately these leaflets can only reach a certain number of women and far too frequently will not be available to the women at the precise



moment when they would be of most benefit. Many women if not pregnant at the time of receiving printed information, will not trouble to read it and even if they do, will probably have forgotten the advice by the time they actually are pregnant. Printed information is valuable, but it cannot replace the personal touch.

The public mind will remain in the present disinterested state until it is compelled to realize that much of the present maternal morbidity and mortality is not only preventable, but also is worth preventing.

Convinced upon these points, the public will soon demand redress, the question will enter the arena of practical politics, financial and other difficulties will be surmounted and eventually we shall have a midwifery service fitted for its task, the safeguarding of the health and well being of mothers.

#### CONCLUSIONS.

From a consideration of the facts submitted the following principal conclusions may be drawn:

1. Whilst the death rate from general causes has been declining the puerperal mortality rate has been rising.

2. The puerperal mortality rate is excessive and is capable of being reduced.

3. Though actual statistics of maternal morbidity (equivalent to those of mortality) are not available, there is little doubt that the total maternal morbidity exceeds by far the mortality resulting from pregnancy and childbirth.

4. Large centres of population in spite of their better facilities for treatment are not necessarily the safest places for the delivery of the parturient mother.

5. Maternal mortality and especially maternal morbidity varies in direct proportion to the inefficiency or inadequacy of the professional care and supervision during the antenatal, natal and postnatal periods.

6. The midwife's responsibility in the causation of maternal mortality is not as great as is customarily held; the medical profession must, individually and collectively, assume a larger share of such responsibility than has prevailed in the past.

7. The maternity bonus has not improved the position of the parturient woman from a statistical point of view.

8. Present methods of control of midwives have not produced the beneficial results which were anticipated; it is not so much the passing of a controlling act as the method and efficiency of its administration which is important.

9. Artificial abortion probably plays an important part in the production of maternal morbidity and mortality.

10. Venereal disease, especially gonorrhœa, is a potent factor in the production of maternal morbidity; treatment of this condition under existing circumstances is extremely unsatisfactory.

11. Employment of women in Australia does not appear to have any marked effect on their maternal welfare.

12. Insanitary conditions in the home have apparently little influence at least on normal labours, though they probably increase the danger in those cases involving operative interference.

13. The control of puerperal sepsis as a cause of maternal mortality in private practice has not been commensurate with that effected in public hospitals.

14. Operative procedures, especially delivery by forceps, are too frequently employed and leave in their wake a certain proportion of mortality and a far greater amount of morbidity and ill health.

15. Students do not receive an adequate training in clinical and practical midwifery, whilst the preventive aspect of midwifery is relegated to a comparatively inferior position in the curriculum.

16. The present type of imperfectly trained (but registered) midwife will tend to impede progress until replaced by a competent successor. Meanwhile it is by no means easy to train the latter in sufficient numbers.

17. Antenatal care and supervision affords a means of controlling much of the present maternal mortality and of eliminating most of the maternal morbidity. Its value is not fully recognized and until it is we shall not make any marked advance from the present unsatisfactory position.

#### EPILOGUE.

It is as a lesson rather than as a reproach that I call up the memory of these irreparable errors and wrongs. No tongue can tell the heart-breaking calamity they have caused; they have closed the eyes just opened upon a new world of love and happiness; they have bowed the strength of manhood into the dust; they have cast the helplessness of infancy into the stranger's arms or bequeathed it with less cruelty, the death of its dying parent.

There is no tone deep enough for regret and no voice loud enough for warning. The woman about to become a mother or with her newborn infant upon her bosom should be the object of trembling care and sympathy wherever she bears her tender burden or stretches her aching limbs. The very outcast of the streets has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law, brought down upon its victim by a machinery as sure as destiny, is arrested in its fall at a word which reveals her transient claim for mercy.

The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should hazard it negligently, unadvisedly or selfishly.<sup>(1)</sup>

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## CRUDE BIRTH RATE.—NUMBER OF BIRTHS PER 1,000 MEAN POPULATION.

Year.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Commonwealth.
1901 .. ..	27.78	25.75	28.53	25.11	30.34	28.60	27.14
1902 .. ..	27.20	25.16	27.89	24.54	30.27	29.23	26.66
1903 .. ..	25.41	24.46	24.62	23.25	30.26	28.62	25.23
1904 .. ..	26.81	24.65	27.13	24.71	30.33	29.60	26.33
1905 .. ..	26.79	24.83	25.92	23.67	30.29	29.33	26.12
1906 .. ..	27.12	25.20	26.31	23.55	30.01	29.82	26.41
1907 .. ..	27.22	25.32	26.98	23.96	29.40	29.50	26.55
1908 .. ..	26.86	24.71	26.99	24.59	29.96	30.90	26.35
1909 .. ..	27.26	24.55	27.52	24.57	28.06	29.86	26.40
1910 .. ..	27.56	24.12	27.58	25.08	27.17	30.26	26.40
1911 .. ..	28.75	24.84	27.65	26.89	28.21	28.57	27.21
1912 .. ..	29.86	26.39	29.67	28.65	28.83	30.53	28.65
1913 .. ..	28.86	25.82	30.24	29.12	29.36	30.03	28.25
1914 .. ..	28.96	25.45	29.46	29.33	28.45	30.33	28.05
1915 .. ..	28.33	24.55	29.35	26.81	27.97	29.32	27.25
1916 .. ..	27.89	24.29	27.91	27.39	27.21	28.47	26.78
1917 .. ..	28.06	23.50	29.09	26.21	25.54	27.03	26.51
1918 .. ..	26.53	22.29	28.37	25.80	22.84	25.91	25.25
1919 .. ..	24.68	21.56	26.23	24.27	21.44	25.12	23.78
1920 .. ..	26.59	24.07	27.58	25.45	24.40	26.37	25.74
1921 .. ..	25.94	23.15	26.59	24.07	23.43	26.97	24.95
1922 .. ..	25.68	23.10	25.53	23.71	23.96	27.07	24.69
1923 .. ..	24.68	22.31	24.89	22.60	22.55	26.27	23.77

## CRUDE DEATH RATE.—NUMBER OF DEATHS PER 1,000 MEAN POPULATION.

Year.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Commonwealth.
1901 .. ..	11.75	13.21	11.98	11.20	13.37	10.52	12.22
1902 .. ..	11.97	13.36	12.17	11.83	13.71	11.00	12.47
1903 .. ..	11.65	12.90	12.38	10.80	12.60	11.92	12.12
1904 .. ..	10.65	11.92	10.11	10.22	11.91	11.04	11.02
1905 .. ..	10.16	12.10	10.47	10.15	10.82	10.29	10.83
1906 .. ..	9.92	12.45	9.56	10.35	11.87	11.24	10.85
1907 .. ..	10.58	11.74	10.39	9.93	11.17	11.14	10.90
1908 .. ..	10.16	12.53	10.34	9.84	10.86	11.71	10.97
1909 .. ..	9.84	11.24	9.79	9.37	9.98	10.00	10.22
1910 .. ..	9.80	11.30	9.80	9.71	9.81	11.49	10.30
1911 .. ..	10.37	11.45	10.65	9.82	10.19	10.13	10.66
1912 .. ..	10.86	12.23	10.96	10.28	11.06	10.73	11.23
1913 .. ..	10.89	11.11	10.39	10.82	9.34	10.87	10.78
1914 .. ..	10.11	11.59	9.97	10.71	9.41	9.67	10.51
1915 .. ..	10.48	11.10	11.00	10.67	9.28	10.11	10.66
1916 .. ..	10.63	11.70	11.09	11.73	9.80	10.38	11.04
1917 .. ..	9.60	10.36	9.64	10.10	8.97	8.89	9.80
1918 .. ..	9.84	10.70	10.39	9.97	9.11	8.84	10.09
1919 .. ..	13.40	13.21	12.42	12.01	11.10	10.37	12.82
1920 .. ..	10.32	11.19	10.82	10.76	10.14	9.35	10.62
1921 .. ..	9.51	10.52	9.34	10.02	10.44	10.30	9.91
1922 .. ..	8.92	9.65	9.14	9.10	9.33	9.29	9.21
1923 .. ..	9.61	10.71	9.83	9.59	8.41	9.92	9.89

<sup>(60)</sup> Report on Maternal Mortality, Scottish Departmental Committee, 1924, page 8.

<sup>(7)</sup> Report of the Medical Officer of Health of Aberdeen, 1922-1923.

<sup>(8)</sup> E. S. Morris: "Education as a Factor in the Control of Venereal Diseases," *Transactions of the Australasian Association for the Advancement of Science*, Volume XVI., 1923, page 666.

<sup>(9)</sup> Report War Cabinet Committee on Women in Industry, 1919.

<sup>(10)</sup> Report on Maternal Mortality, Scottish Departmental Committee, 1924, page 11.

<sup>(11)</sup> Report of the Medical Officer of Health of Glasgow, 1923.

<sup>(12)</sup> Oliver Wendell Holmes: "The Contagiousness of Puerperal Fever," 1843.

<sup>(13)</sup> W. E. Fothergill: "Puerperal Pelvic Infection," *The British Medical Journal*, May 3, 1924, page 773.

<sup>(14)</sup> E. Eno: "Study in Puerperal Morbidity," *Surgery, Gynecology and Obstetrics*, June, 1923, page 797.

<sup>(15)</sup> Boxall, *Transactions of the Obstetrical Society*, 1905 (quoted by Newsholme).

<sup>(16)</sup> B. P. Watson: "The Teaching of Obstetrics," *The British Medical Journal*, December 27, 1924, page 1187.

<sup>(17)</sup> George Geddes: "Statistics of Puerperal Fever and Allied Infectious Diseases."

<sup>(18)</sup> Alick W. Bourne, "The Prevention of Puerperal Infection," *The British Medical Journal*, July 2, 1921, page 27.

## INFANTILE MORTALITY RATE.—NUMBER OF DEATHS UNDER ONE YEAR PER 1,000 BIRTHS.

Year.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Commonwealth.
1901 .. ..	103.74	102.94	101.94	99.99	123.89	89.05	103.61
1902 .. ..	109.74	108.60	100.17	94.00	142.01	79.06	107.15
1903 .. ..	110.35	106.40	119.88	97.09	141.22	110.83	111.36
1904 .. ..	82.42	77.92	76.13	70.51	113.02	90.70	81.77
1905 .. ..	80.55	83.30	75.52	72.96	104.19	80.65	81.76
1906 .. ..	74.53	92.92	74.68	75.90	110.00	90.19	83.26
1907 .. ..	88.45	72.59	77.64	66.76	97.51	81.09	81.08
1908 .. ..	75.20	86.05	70.67	69.46	84.72	75.16	77.78
1909 .. ..	73.87	71.36	71.50	61.04	78.01	64.91	71.56
1910 .. ..	74.73	76.88	62.90	70.70	78.18	101.68	74.81
1911 .. ..	69.46	68.70	65.36	60.60	76.01	73.39	68.49
1912 .. ..	71.00	74.48	71.73	61.68	82.06	66.80	71.74
1913 .. ..	77.78	70.53	63.35	69.93	70.30	70.68	72.21
1914 .. ..	69.29	78.27	63.93	75.79	68.12	71.46	71.47
1915 .. ..	67.67	68.78	64.33	67.04	66.54	72.37	67.52
1916 .. ..	67.15	74.63	70.27	73.21	66.22	74.97	70.33
1917 .. ..	56.93	56.82	53.87	53.06	57.09	52.27	55.91
1918 .. ..	59.02	61.75	56.66	51.25	57.13	60.80	58.57
1919 .. ..	71.83	67.90	71.88	64.01	61.12	64.97	69.21
1920 .. ..	69.41	73.70	63.24	67.34	66.02	65.51	69.14
1921 .. ..	62.56	72.55	54.16	65.48	78.26	78.02	65.73
1922 .. ..	53.60	53.35	50.38	47.50	55.59	55.70	52.74
1923 .. ..	60.68	65.70	53.95	60.30	56.02	57.45	60.52

## COMMONWEALTH.—DEATHS PER 1,000 INFANTS (TOTAL LEGITIMATE AND TOTAL ILLEGITIMATE BIRTHS, RESPECTIVELY) OF MARRIED COMPARED WITH SINGLE WOMEN FROM PUERPERAL CAUSES.

Year.	Married Women.		Single Women.	
	Deaths from Puerperal Septicæmia per 1,000 Births.	Deaths from Other Puerperal Causes per 1,000 Births.	Deaths from Puerperal Septicæmia per 1,000 Births.	Deaths from Other Puerperal Causes per 1,000 Births.
1908 .. ..	1.7	3.5	3.2	4.6
1909 .. ..	1.6	3.2	4.2	5.1
1910 .. ..	1.9	3.4	3.2	3.8
1911 .. ..	1.5	3.2	4.5	4.6
1912 .. ..	1.5	2.9	3.6	5.1
1913 .. ..	1.6	3.0	3.0	4.7
1914 .. ..	1.4	3.0	2.9	2.7
1915 .. ..	1.1	2.8	4.6	5.5
1916 .. ..	1.9	3.2	6.6	5.1
1917 .. ..	1.7	3.6	4.3	4.2
1918 .. ..	1.4	3.0	2.0	6.0
1919 .. ..	1.2	3.2	2.9	3.5
1920 .. ..	1.6	3.1	4.8	4.0
1921 .. ..	1.5	3.0	2.6	5.8
1922 .. ..	1.3	3.0	2.9	3.4
1923 .. ..	1.6	3.3	3.8	4.9
	-0.6%	+1.6%	+2.1%	+2.2%

+ Indicates an increase and — a decrease in the respective rates. There is an increase of 0.8% of the deaths from all puerperal causes among married women and an increase of 2.2% among single women.

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(15) Fourness Barrington: "Obstetric Mortality," *THE MEDICAL JOURNAL OF AUSTRALIA*, September 11, 1920, page 236.

(16) Matthews Duncan: "The Mortality of Childbed and Maternity Hospitals," 1870.

(17) Eardley Holland: "Fœtal Death," Ministry of Health Reports, No. 7.

(18) Report of the Royal Hospital for Women, Paddington, Sydney, 1923.

(19) Report of the Women's Hospital, Crown Street, Sydney, 1922.

(20) T. W. Eden: "Maternal Mortality of Child-Bearing: Its Causes and How to Deal with Them," *The Lancet*, November 11, 1922, page 998.

(21) M. A. Tate: "A Method of Delivery in Normal Cases," *The American Journal of Obstetrics and Gynecology*, January, 1922, page 61.

(22) Comyns Berkeley: "Some Practical Difficulties in Obstetrics and Gynecology," *The British Medical Journal*, January 20, 1923, page 89.

(23) Irving W. Potter: "The Place of Version in Obstetrics."

(24) B. Whitehouse: "An Address on Puerperal Sepsis: Its Prevention and Treatment," *The Lancet*, May 31, 1924, page 1091.

(Continued on page 345).



1924.—DENSITY OF POPULATION IN THE VARIOUS DIVISIONS OF THE SEVERAL STATES AND OF AUSTRALIA.

State.	District.	Area in square miles.	Population.	Density persons per square mile.	District.	Area in square miles.	Population.	Density persons per square mile.
New South Wales .. ..	Municipalities ..	2,846	1,404,357	493.70	Shires .. ..	181,112	665,916	3.69
					Area not incor-	.. ..	.. ..	.. ..
					porated .. ..	125,475	14,883	0.12
Victoria .. .. .	Cities, Towns and Boroughs	349	915,531	2,626.64	Shires .. ..	87,529	609,827	6.97
					Area not incor-	6	174	26.38
					porated .. ..	669,384	421,189	0.63
Queensland .. .. .	Cities and Towns	510	329,370	646.80	Shires .. ..	.. ..	.. ..	.. ..
					Area not incor-	606	1,621	2.67
					porated .. ..	46,260	263,107	5.69
South Australia .. ..	Corporations ..	84	212,779	2,523.77	District Councils	.. ..	.. ..	.. ..
					Area not incor-	.. ..	.. ..	.. ..
Western Australia .. ..	Municipalities ..	100	166,235	1,654.74	porated .. ..	336,726	16,180	0.05
Tasmania .. .. .	Urban Municipalities ..	377	87,703	232.67	Road Districts ..	975,320	161,307	0.17
Northern Territory .. ..					Rural Municipalities ..	25,839	125,425	4.85
Federal Territory (including Jervis Bay) .. .. .					Total incorporated areas ..	1,985,944	2,249,771	1.12
					Total unincorporated areas	459,813	32,858	0.07
Total Australia .. .. .		4,266	3,116,975	730.69				

CAUSES OF PUERPERAL MORTALITY—STATES AND COMMONWEALTH.  
Number of Deaths from Puerperal Conditions—New South Wales.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	42	44	21	37	44	44	31	39	52	26	41	36	30	35	28	30	42
Puerperal hemorrhage ..	21	13	17	25	31	30	31	33	28	37	48	32	41	40	31	35	28
Other accidents of childbirth ..	33	36	38	9	17	30	47	42	36	25	34	33	10	15	22	43	29
Puerperal septicaemia ..	71	89	86	104	90	106	115	86	81	124	118	83	73	101	84	97	103
Puerperal albuminuria and eclampsia ..	40	37	30	30	40	48	61	50	33	56	53	42	47	47	49	29	65
Puerperal phlegmasia alba dolens ..	3	—	—	12	14	19	7	12	8	23	31	25	22	20	13	18	36
Other puerperal accidents (sudden death) ..	30	26	23	13	11	2	3	1	3	4	—	2	4	4	4	3	3
Puerperal diseases of the breast ..	—	1	—	—	—	—	—	—	—	1	—	2	—	—	1	—	—
All causes .. .. .	240	246	215	230	247	279	295	263	241	296	325	255	227	262	232	255	306
Total births .. .. .	42,201	42,458	43,782	45,444	47,537	51,861	52,186	53,641	52,931	52,080	52,448	50,709	48,532	53,942	54,636	55,170	54,069
Puerperal mortality rate <sup>1</sup>	5.69	5.79	4.91	5.06	5.20	5.38	5.65	4.90	4.55	5.68	6.20	5.03	4.68	4.86	4.25	4.62	5.65

<sup>1</sup> Number of deaths per 1,000 births.

Number of Deaths from Puerperal Conditions—Victoria.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	26	19	27	31	27	22	21	27	36	20	20	17	31	26	20	25	18
Puerperal hæmorrhage ..	14	11	12	24	11	17	22	17	17	24	24	21	24	22	30	19	14
Other accidents of child-birth ..	29	29	26	6	7	15	27	30	18	13	23	17	16	20	13	18	17
Puerperal septicæmia ..	44	49	46	49	53	66	57	55	39	61	54	45	38	85	61	39	54
Puerperal albuminuria and eclampsia ..	29	19	30	18	36	35	24	16	17	27	33	25	27	29	42	18	27
Puerperal phlegmasia alba dolens ..	—	3	—	5	10	5	15	3	3	1	6	11	7	16	5	15	15
Other puerperal accidents (sudden death) ..	24	17	8	18	6	1	3	—	—	1	—	—	1	1	1	2	2
Puerperal diseases of the breast ..	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
All causes ..	166	147	149	151	150	161	170	148	130	147	160	136	144	199	181	136	147
Total births ..	31,365	31,097	31,544	31,437	33,026	35,796	35,970	36,222	35,009	34,235	33,033	31,597	31,619	36,213	35,591	36,288	35,877
Puerperal mortality rate <sup>1</sup>	5.29	4.73	4.72	4.80	4.54	4.50	4.73	4.08	3.71	4.29	4.84	4.30	4.55	5.50	5.09	3.75	4.09

<sup>1</sup> Number of deaths per 1,000 births.

Number of Deaths from Puerperal Conditions—Queensland.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	18	25	7	21	23	16	10	15	21	13	20	8	9	14	18	21	9
Puerperal hæmorrhage ..	6	2	6	12	10	14	15	13	7	16	11	11	13	9	16	18	16
Other accidents of child-birth ..	21	12	21	5	8	16	16	17	15	17	20	15	8	17	11	7	21
Puerperal septicæmia ..	19	20	31	23	30	27	22	28	30	40	32	22	27	28	25	23	34
Puerperal albuminuria and eclampsia ..	13	18	15	21	18	18	17	18	18	23	30	30	28	13	28	28	39
Puerperal phlegmasia alba dolens ..	—	—	—	7	4	5	2	—	2	6	6	6	5	3	7	6	8
Other puerperal accidents (sudden death) ..	11	5	7	7	5	3	—	1	1	3	5	—	1	1	3	—	—
Puerperal diseases of the breast ..	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—
All causes ..	88	82	88	96	98	99	82	92	94	118	125	92	91	85	108	103	127
Total births ..	14,540	14,830	15,552	16,169	16,984	18,738	19,731	19,882	20,163	18,912	19,787	19,536	18,699	20,256	20,329	19,987	19,982
Puerperal mortality rate <sup>1</sup>	6.05	5.53	5.66	5.94	5.77	5.28	4.16	4.63	4.66	6.24	6.32	4.71	4.87	4.20	5.31	5.15	6.35

<sup>1</sup> Number of deaths per 1,000 births.

Number of Deaths from Puerperal Conditions—South Australia.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	5	7	5	10	9	4	9	7	7	10	4	7	4	10	17	7	11
Puerperal hæmorrhage ..	—	2	5	9	11	5	5	6	3	7	7	4	11	6	14	6	5
Other accidents of child-																	
birth ..	9	6	14	4	4	5	3	4	5	1	9	4	4	4	8	7	6
Puerperal septicæmia ..	19	18	19	19	21	18	24	28	18	32	14	13	13	19	23	11	22
Puerperal albuminuria and																	
eclampsia ..	7	7	8	3	12	10	11	11	13	11	10	13	16	13	10	12	10
Puerperal phlegmasia alba																	
dolens ..	—	1	—	4	3	4	2	4	4	4	4	5	3	6	1	5	3
Other puerperal accidents																	
(sudden death) ..	4	6	5	2	4	2	2	2	1	—	—	1	1	—	—	2	—
Puerperal diseases of the																	
breast ..	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
All causes ..	44	47	56	51	64	48	58	62	54	67	48	47	55	58	73	50	57
Total births ..	9,211	9,756	10,064	10,540	11,057	12,079	12,627	12,904	11,798	11,857	11,326	11,357	11,060	12,028	11,974	12,001	11,592
Puerperal mortality rate <sup>1</sup>	4.78	4.82	5.56	4.84	5.79	3.97	4.59	4.80	4.58	5.65	4.24	4.14	4.97	4.82	6.10	4.17	4.87

<sup>1</sup> Number of deaths per 1,000 births.

Number of Deaths from Puerperal Conditions—Western Australia.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	14	9	5	8	7	5	3	8	4	9	6	—	9	13	4	7	5
Puerperal hæmorrhage ..	1	1	4	3	4	5	7	2	5	3	2	2	8	7	1	7	4
Other accidents of child-																	
birth ..	8	10	13	2	3	12	4	12	6	7	8	6	3	4	2	8	2
Puerperal septicæmia ..	19	14	10	14	9	9	9	10	7	17	19	10	11	14	5	11	12
Puerperal albuminuria and																	
eclampsia ..	6	8	8	2	3	6	7	8	6	8	6	9	7	10	8	6	7
Puerperal phlegmasia alba																	
dolens ..	—	—	—	1	3	—	3	2	3	1	1	5	1	3	1	2	—
Other puerperal accidents																	
(sudden death) ..	4	8	6	3	1	—	—	1	—	1	—	1	—	—	1	2	2
Puerperal diseases of the																	
breast ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All causes ..	52	50	46	33	30	37	25	43	31	46	42	33	39	51	22	43	32
Total births ..	7,712	7,755	7,602	7,585	8,091	8,689	9,218	9,204	9,017	8,563	7,882	7,106	6,937	8,149	7,807	8,131	7,854
Puerperal mortality rate <sup>1</sup>	6.74	6.45	6.05	4.35	3.71	4.26	3.66	4.67	3.44	5.37	5.33	4.64	5.82	6.26	2.82	5.29	4.07

<sup>1</sup> Number of deaths per 1,000 births.



Number of Deaths from Puerperal Conditions—Tasmania.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	4	6	5	5	7	1	1	2	6	3	1	5	1	2	6	3	2
Puerperal hemorrhage ..	3	2	2	3	4	4	1	4	4	4	3	3	4	12	2	6	5
Other accidents of child- birth ..	3	5	6	5	1	5	10	3	2	—	2	2	—	4	4	4	3
Puerperal septicaemia ..	7	12	9	9	5	5	8	8	7	8	13	10	4	3	10	15	8
Puerperal albuminuria and eclampsia ..	3	6	—	3	7	3	2	8	7	1	5	7	4	5	4	2	1
Puerperal phlegmasia alba dolens ..	—	—	—	—	—	2	3	1	—	2	5	2	1	1	1	3	2
Other puerperal accidents (sudden death) ..	4	3	1	5	1	—	—	—	—	—	1	—	—	1	—	—	—
Puerperal diseases of the breast ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All causes ..	24	34	23	30	25	20	25	26	26	18	30	29	14	28	27	33	22
Total births ..	5,291	5,615	5,550	5,586	5,437	5,853	5,886	6,017	5,845	5,642	5,376	5,280	5,310	5,740	5,755	5,817	5,657
Puerperal mortality rate <sup>1</sup>	4.54	6.05	4.18	5.37	4.60	3.42	4.25	4.32	4.45	3.19	5.58	5.49	2.64	4.88	4.69	5.67	3.88

<sup>1</sup> Number of deaths per 1,000 births.

Number of Deaths from Puerperal Conditions—Commonwealth.

Condition.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.
Accidents of pregnancy ..	109	110	70	112	117	92	75	98	129	82	92	73	84	100	102	94	87
Puerperal hemorrhage ..	45	31	46	76	71	75	83	75	64	91	96	73	101	96	94	91	72
Other accidents of child- birth ..	103	98	118	31	40	83	107	108	82	63	97	77	44	64	60	87	78
Puerperal septicaemia ..	179	202	201	218	209	231	235	215	182	282	250	183	166	250	208	196	233
Puerperal albuminuria and eclampsia ..	98	95	91	77	116	120	122	111	94	126	137	126	129	117	141	95	149
Puerperal phlegmasia alba dolens ..	3	4	—	29	34	35	32	22	20	37	53	54	39	49	28	49	64
Other puerperal accidents (sudden death) ..	77	65	50	48	28	8	8	5	5	9	6	4	7	7	9	9	8
Puerperal diseases of the breast ..	—	1	1	—	—	—	1	—	—	3	1	2	—	—	1	—	—
All causes ..	614	606	577	591	615	644	663	634	576	693	732	592	570	683	643	621	691
Total births ..	110,347	111,545	114,071	116,801	122,193	133,088	135,714	137,983	134,871	131,426	129,985	125,739	122,290	136,406	136,198	137,496	135,222
Puerperal mortality rate <sup>1</sup>	5.56	5.42	5.05	5.05	5.03	4.83	4.88	4.59	3.52	5.27	5.62	4.70	4.65	5.00	4.71	4.51	5.04

<sup>1</sup> Number of deaths per 1,000 births.

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## Reports of Cases.

### PREGNANCY WITH MALFORMATION OF THE VAGINA.

By H. A. RIDLER, M.B., Ch.M. (Sydney),  
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Royal Hospital for Women Paddington.

Mrs. A.B., aged twenty three years, married one year and nine months, pregnant for the first time, was admitted into the Women's Hospital, Crown Street, having been in labour about six hours. She was thought to have an unruptured hymen obstructing delivery. An attempt had been made to perforate or rupture it, but an opening was not found.

On examination I found that a vagina did not exist, its place being taken by very soft tissue. The abdomen was of unusual contour, the uterus being long and narrow. The foetal head occupied the fundus which was curved over to the left side of the abdomen.

According to the patient's dates she was eight months pregnant.

I did a Cæsarean section. I found that the uterus was sausage shaped and curved over to the left side, this being due to the left broad ligament extending to a higher level on the left side of the uterus than on the right. An incision was made in the upper uterine segment extending to the top of the fundus; the uterine muscle

was much thinner than normal. A male child was extracted. After removal of the placenta and membranes I gently forced two fingers from the inside of the uterus through the soft tissue between the uterine cavity and the vulva to allow for drainage of the lochia. This was necessary as apparently no natural cervical opening existed, although the fact that the patient had become pregnant shows there must have been some sort of a canal connecting the vulva with the uterine cavity. The left tube and ovary were normal, the right tube and ovary were absent. There was no scar tissue visible and no other evidence of their having been removed, although the patient had a section done in Wales when she was thirteen and a half years old; this was done on account of a "lump" in her right side. She had pain for two weeks and the lump for one week before the operation. Three weeks after the section she was given another anæsthetic. She surmised it was given prior to curettage, as she had been bleeding from the vulva for the next seven days.

Two months later she menstruated for the first time and continued to do so regularly without dysmenorrhœa. Her menstrual period extended over three days.

She was never at any time informed of malformation, but she states she was always examined *per rectum*.

The patient made an uninterrupted recovery after the Cæsarean section. On examination nine weeks later there was only a depression on the vulva and an opening large enough to admit a probe, *per rectum* a very small uterus could be palpated.

The uterus could only have been partially developed as shown by the thinness of its muscle walls and its shape.

That a Cæsarean section was necessary is obvious, but whether a hysterectomy should have been done requires careful consideration. I had a somewhat similar experience before and the lochia drained away satisfactorily by the method already described. In this previous case the vagina was absent. Only a dimple could be seen on the vulva and soft tissue occupied the area between the vulva and lower part of the uterus. The internal organs, uterus, ovaries and tubes were normal. As in the case already described some fine canal must have existed between the dimple on the vulva and the uterine cavity, the external opening of which could not be detected in the later months of pregnancy.

My third patient whom I had seen before the other two, came to me to know if she was pregnant. She had been married for some months and had lost very little at each of the last two or three periods. She stated that previously she lost a large amount at each of her periods.

On examination the vagina was absent, there was a small depression on the vulva. I failed by inspection to detect any opening in this depression, although there must have been one; *per rectum* I could feel that the uterus was not enlarged.

I told her she had a malformation and that it was not possible for her to become pregnant. This information annoyed her, consequently she did not return to me although I asked her to do so.

These cases demonstrate the necessity of giving a guarded opinion as to the possibility of pregnancy with malformation of the generative organs.

## Reviews.

### A MANUAL OF OBSTETRICS.

"A GLASGOW MANUAL OF OBSTETRICS" is a product of combined authors, obstetricians and gynecologists on the staffs of the principal Glasgow hospitals.<sup>1</sup> It represents the teaching of the Glasgow Royal Maternity and Women's Hospital. As a result of the combined authorship the book shows a considerable breadth of view and yet it is not characterized by the usual pitfall of combined text-

<sup>1</sup> "A Glasgow Manual of Obstetrics," by Samuel J. Cameron, M.B., (Glasgow), F.R.F.P., and S.G.; Archibald N. McLellan, M.B., (Glasgow), L.M. (Dublin); Robert A. Lennie, M.B., (Glasgow); John Hewitt, M.B., (Glasgow); 1924. London: Edward Arnold and Company. Royal 8vo., pp. xvi. + 573, with illustrations. Price: 21s. net.

books, that of compromise. The teaching throughout is definite and concise. The work is arranged in nine sections and while some of these are not really self-contained, they deal in general with complete subdivisions of the subject. Thus separate sections are devoted to the puerperium, diseases of pregnancy, hæmorrhages, delay, injuries of the birth canal, the infant and obstetrical operations.

Throughout the book the latest published work has been embodied. A good general summary of modern biochemical theories and experimental results is to be found in the different sections and such work as that of Berkeley, Dodds and Walker on metabolic tests for liver function. Gordon Ley's work on the pathology of accidental hæmorrhage and Eardley Holland's observations on intracranial hæmorrhage in the new-born are included. Another point of use to students and practitioners is the excellent tabulation of the various signs, symptoms, theories and so forth in the several chapters. The illustrations are clear and simple, most of them being from the pen of A. K. Maxwell.

The use of pituitary extract in labour is discussed at length and the indications for and against its use are fairly stated. But in the induction of labour the authors recommend the Watson technique which includes giving as much as six doses of 0.5 cubic centimetre of pituitary extract at half hourly intervals after quinine and castor oil have been used. The weight of modern and obstetrical thought is against the use of pituitary extract before the cervix is fully dilated and on page one hundred and twenty-six the authors themselves give this as an essential preliminary to the administration of pituitary extract. Further, they admit that in two instances they have seen bad results, one an accidental hæmorrhage and one a badly lacerated cervix after using the drug with a closed cervix.

The book is one which can be recommended to students and practitioners as a practical and up-to-date summary of obstetrics. We would wish, however, to see a chapter included on antenatal care, as this is now such an important branch of obstetrical work.

#### A COMPENDIUM OF OBSTETRICS.

THE ninth edition of Dr. Samuel Nall's "Aids to Obstetrics" has been revised by Dr. C. J. Nepean Longridge.<sup>1</sup> The writer of this little book has selected the important points in the subject and arranged them in a suitable manner. The amount of information given is exceedingly large. Although we disapprove on principle of condensed books of this nature, this volume will probably be useful to those who care to revise essential facts in this way.

#### A HANDBOOK OF MIDWIFERY AND GYNÆCOLOGY.

THE present edition of Dr. A. W. Bourne's very useful book has been enlarged by the addition of a section on gynæcology.<sup>2</sup> Many authors are recently adopting this plan of combining a study of obstetrics and gynæcology in the covers of one textbook. It is felt that as the great majority of ailments treated in gynæcological practice are caused by traumatism or infection in childbirth, a combined textbook may tend to impress on the mind of the student the importance of the study of obstetrics. Moreover, there must necessarily be a considerable amount of duplication of material in two separate volumes. In this synopsis two hundred and thirty-two pages are devoted to obstetrics and one hundred and eighty-nine to gynæcology with a full

index. It is intended by the author that the book should be of special service to students who are revising for examinations and also as a quick reference for differential diagnosis and treatment for the general practitioner.

The general arrangement of matter makes it specially suitable for these purposes; for example the placing in parallel columns of the signs and symptoms in chronic nephritis and lesions of the kidney in pregnancy and the summary (quoted from Herman) of the signs in flat pelvis and generally contracted pelvis.

New matter has been added since the last edition, so as to bring the book up to date and standard authors are freely quoted. The result is that on the whole it may be taken as a summary of the accepted teaching of the present day in British obstetrics and gynæcology. When a writer quotes many authors, however, there is always some loss of individuality and advice is given which is evidently not the wisdom born of actual experience. Two examples of this are taken at random. On page 37 the use of veratrine in the treatment of eclampsia is discussed and under a certain set of conditions a dose of one cubic centimetre is recommended. Those who have had actual experience of the use of veratrine in eclampsia, will agree that such a dose is likely to have tragic results. Again in describing the extraperitoneal Cæsarean section, an operation devised for use in the presence of infection and said not to be favoured in England, transverse incision of the lower uterine segment is advised. Surgeons who have performed this operation or who have seen it performed, will realize the very great risk involved, especially of injury to the large veins on each lateral aspect of the lower uterine segment or cervix when this incision is used. At the same time the reader is reminded by the author that his synopsis is not intended to replace textbooks, but to act as a supplement to them.

In the section of gynæcology a chapter on development of the genital organs and malformations is particularly clear and concise. A welcome new feature is the short account of palliative treatment of malignant disease by radium with the technique of radium application.

There are many excellent diagrams and line drawings to illustrate the text.

#### A HANDBOOK OF SURGERY.

"MINOR SURGERY," by Mr. Lionel R. Fifield, of the London Hospital, is intended for students and medical practitioners.<sup>3</sup> The author does not state exactly what is meant by minor surgery and a better title for the book might have been chosen. It contains chapters on fractures, dislocations, injuries of joints, infections of the hand, minor surgical operations, the after treatment of operations and so forth. The chapters on fractures and infections of the hand are the best part of this work. They are undoubtedly well written and represent the teaching of most authorities on these subjects. The use of the expanding probang for removal of fish bones from the œsophagus is a practice likely to be condemned by ear, nose and throat surgeons. The advice that Colles's fracture should be reduced under anaesthesia can be thoroughly endorsed. No mention is made of Sir Robert Jones's method of reducing Colles's fracture. The operation of skin grafting, essentially a minor surgical procedure, is not described.

As a comprehensive and authoritative book of reference "Minor Surgery" falls somewhat short of the standard of excellence set by some other authors, but it can be profitably used by the student in connexion with his work in all parts of the hospital. Books of this type should be used in this way and should not be learned parrot fashion for the purpose of passing examinations. The general get-up of the book is excellent. The illustrations are numerous and well produced.

<sup>1</sup>"Aids to Obstetrics," by Samuel Nall, B.A., M.B. (Cantab.), M.R.C.P. (London). Revised by C. J. Nepean Longridge, M.D. (Vict.), F.R.C.S. (England). M.R.C.P. (London). 1925. London: Baillière, Tindall and Cox. Foolscape 8vo., pp. viii. + 228. Price: 3s.

<sup>2</sup>"Synopsis of Midwifery and Gynæcology," by Aleck W. Bourne, B.A., M.B., B.Ch. (Cam.), F.R.C.S. (Eng.). Third Edition. Revised and Enlarged: With numerous diagrams. 1925. Bristol: John Wright & Sons Limited. Crown 8vo., pp. vii. + 434. Price: 15s. net

<sup>3</sup>"Minor Surgery," by Lionel R. Fifield, F.R.C.S. (Eng.). 1925. London: H. K. Lewis & Company Limited. Crown 8vo., pp. ix. + 431. Price: 12s. 6d. net.



## The Medical Journal of Australia

SATURDAY, SEPTEMBER 12, 1925.

### The Prize Essay.

THE essay on maternal morbidity and mortality for which Dr. E. S. Morris was awarded the prize by the Melbourne Permanent Committee for Post-Graduate Work, is a masterly treatise in preventive medicine, conceived in a fearless spirit and developed with sound philosophy and unerring logic. It contains so much for the medical profession to read, mark, learn and inwardly digest that analysis and comment at this stage would be superfluous. Moreover, since the Committee has approached the authors of other essays through our columns for permission to utilize their recommendations and advice, we are persuaded that a discussion of the practical measures proposed to lessen the dangers of childbirth should be deferred until the further information is available. We wish to congratulate Dr. Morris on his admirable contribution and the Melbourne Permanent Committee for Post-Graduate Work on its public spirited and generous action which has led to the compilation of so splendid an effort.

#### THE HUNTER MEMORIAL.

No legacy is so valuable as the record of a life spent in the search for truth. Science has been founded on the disinterested and altruistic efforts of men who care nothing for rewards, but devote their lives to the accumulation of knowledge for its own sake. The professional life of John Irvine Hunter was short, terribly short; but his influence in the world of medicine will persist because he taught by example and precept that man's highest function is to penetrate the obscurity that veils the secrets of Nature.

On March 23, 1925, a meeting of interested persons was held for the purpose of discussing the best means of perpetuating the memory of the great boy anatomist, John Irvine Hunter. Those assembled resolved to open a fund for this purpose.

Many suggestions were offered in regard to the form of the memorial, but no plan was then adopted. At a subsequent meeting Dr. Hugh R. G. Poate put forward a concrete proposal. According to this the objects of the fund are to be six in number. In the first place a portrait of Hunter is to be painted and displayed in the Great Hall of the University of Sydney. The second objective is the preparation of a bust of the young anatomist to be placed in the Medical School of the University of Sydney. The third proposal is to establish an annual oration on some subject embodying the results of original research of thought, and a medal. The fourth is to institute a library to contain all current medical, scientific and clinical literature and standard works of reference in each branch of medicine. The fifth suggestion is to establish a laboratory for the conduct of clinical research work. This laboratory would be known as the John Irvine Hunter Research Laboratory. The New South Wales Government is to be requested to provide the building, while its endowment and equipment would be a charge on the Memorial Fund. In the last place it is proposed that annual scholarships should be offered to research workers in the laboratory. This programme has been accepted, at all events tentatively. The functions of the laboratory have been defined. From this it appears that the first place will be given to research into the incidence and causation of disease with the object of improving diagnosis and treatment. The workers will be encouraged to focus their attention on the diseases commonly encountered in Australia and especially those affecting children. The causes of invalidity are to be given the next place. It is stipulated that certain facts which may be ascertained in regard to the prevention of disease, are to be brought to the notice of the public. Facilities are to be offered to competent voluntary workers and senior students are to be instructed in the more advanced methods of research work.

The functions of the library have also been defined in a comprehensive manner. It is recognized that this somewhat ambitious programme will necessitate a relatively large amount of money for its translation into action. The portrait and bust can be provided for small sums. Similarly the annual

oration and medal need not cost much. The committee would be satisfied with three thousand pounds for the library, although we venture to suggest that this sum would be inadequate for a complete reference library. The laboratory is the most expensive item on the list. If the building were provided, the equipment could be obtained for fifteen thousand pounds. The committee estimates that a capital sum of £105,000 would be needed for the endowment. This would enable the committee to engage the services of a competent director, two assistants, two whole-time and two half-time scholars and the necessary staff of attendants. The idea is highly commendable since it embodies the recognition of the value of brains. It is infinitely wiser to spend money on skilled work than to disburse the greater part of a fund on bricks and mortar and expensive apparatus and to endeavour to recruit the workers on mere pittances. It is true that the real scientist will be attracted by his work, not by adequate remuneration. But in these days of costly living even the most enthusiastic investigator will not be able to continue research work unless he receive sufficient payment. A hungry man cannot do good work. Moreover, it is inadvisable to compel research workers to seek additional employment to keep body and soul together.

The programme of the committee would have secured the full approval of John Irvine Hunter. The establishment of a research laboratory where highly trained men and women will search for truth and find it, must commend itself to all as a fitting memorial to Hunter. The Medical School of the University of Sydney would gain by such a foundation, partly because it will serve to honour one of its most brilliant students and partly because it will offer to other graduates facilities for carrying out original investigations. The medical profession in the Commonwealth and indeed in the whole Empire would benefit by it, for knowledge gained by members of the medical profession is necessarily common knowledge. The community would ultimately be the chief gainers, for fresh knowledge concerning disease means a step forward toward its prevention.

It is desirable that the wealthy members of the community shall provide the greater part of the John Irvine Hunter Memorial Fund. In other countries the wealthy have realized the wisdom of dedicating the greater part of their riches to research in medical science. The great captains of Australian industry have still to learn their duty in this respect. While every endeavour will be made to educate the lay public to invest money in the syndicate of medical research, the medical profession should lead the way. Example is the best stimulus to generosity. A small amount has already been collected for this purpose. We appeal to the members of the medical profession to provide a substantial nucleus around which a large fund can be amassed. It would be a fitting tribute to the genius of John Irvine Hunter.

### Current Comment.

#### THE PHYSIOLOGICAL CHEMISTRY OF LACTIC ACID.

MANY facts taught to students in the physiological laboratory cease to have any interest as soon as the final examination is passed. These facts are taught without reference to the biochemistry of the body in health and disease and their importance is often unrecognized. We have urged for many years that medical chemistry should be studied in association with the functions of the organs and tissues and with the modification of these functions as a result of disease processes. It is a waste of time and energy to learn the distribution of the chemical constituents of certain tissue fluids and to study the manner in which these constituents are formed as abstract problems and after the lapse of some years to encounter the same chemical bodies during the study of pathological disturbances of biochemical phenomena. In many instances the real significance of these chemical and physical reactions within the body is missed, because even the teachers make no attempt to trace the processes in the healthy body and to ascertain the nature and the magnitude of the failure when the normal processes are disturbed.

In the old textbooks it is set forth that lactic acid occurs normally as a result of muscular action and that the same acid is found in the urine in phosphorus, cyanide of potash and arsenical poisoning, in the gastric secretion in cancer of the stomach and in the tissues after death. It is also taught that lactic acid is formed by the fermentation of lactose. It is true that clinicians have endeavoured to utilize the fact that lactic acid appears in substantial quantities in gastric carcinoma as a diagnostic measure. To gather stray scraps of information concerning so important a substance as lactic acid

is not a scientific procedure and is not the proper basis for any refined contribution to diagnosis.

Professor F. Knoop has recently attempted to tell the story of the formation and fate of lactic acid in the body in its proper perspective.<sup>1</sup> In the first place he points out that under ordinary circumstances the formation of lactic acid takes place without oxidation and consequently without the liberation of heat. The commonest origin of lactic acid is lactose. Embden found that under normal conditions lactose is split by enzymic action and that a substance called lactacidogen is formed. This substance is a hexose-phosphoric ester. Leonard Hill and others discovered that as soon as this substance is dissociated into lactic acid and phosphoric acid, the former is resynthesized into sugar and glycogen. By analysis it has been demonstrated that the quantity of lactic acid circulating in the blood is less than 10% of the amount of blood sugar. Unless certain pathological conditions obtain, none passes through the renal filter. The curious thing about the fate of the lactic acid is that while no one has yet succeeded in converting it into sugar in the test tube, this process takes place readily within the body.

Lactic acid can be formed from albumin. Even in this process the origin is independent of oxidation. Lactic acid serves as an intermediate product in the production of carbohydrate from protein. Professor Knoop goes a step further and expresses the opinion that lactic acid may appear in the process of the production of carbohydrate from fat. He admits that there is a chemical difficulty to be explained in this connexion. If fatty acids are dissociated in such a manner that the oxygen is always attached to the second carbon of the fatty acid radicle, it would be impossible for lactic acid to be split off from the fatty acid radicle because the oxygen is in the  $\alpha$  and not in the  $\beta$  position. It has been shown, however, that lactic acid is excreted in the urine of pigs who have received propionic acid. The suggestion was therefore made that the physiological possibility of the formation of lactic acid by the oxidation of a fatty acid in the  $\alpha$  position had been demonstrated. Apart from the consideration of analogous oxidation of phenyl propionic acid, there are many reasons why the true interpretation of the appearance of lactic acid is not that of this form of oxidation. The fact that when lactic acid appears in urine, no matter whether the animal is poisoned with potassium cyanide, phosphorus or arsenic or has been fed with propionic or valerianic acid, the concentration of lactic acid in the blood is not increased. Moreover, both under normal and abnormal conditions large quantities of lactic acid are formed. The only rational explanation of the pathological appearance of the acid in the urine is that the renal parenchyma is damaged. Professor Knoop suggests that if his contention is correct that the relationship of lactic acid to glucose is one of a reversible reaction, the more exact study of the conditions under which the

production of lactic acid varies, will lead to important disclosures concerning the metabolism of tumours and many other pathological conditions.

#### LOSS OF HEAT AND WEIGHT IN THE NEW BORN.

It is commonly recognized that a child loses weight during the first two or three days after birth. During this period it has to adapt itself to entirely new conditions. It is no longer dependent on the maternal circulation for its nutriment and a supply of milk from the mother is not possible for a day or two. The organs of the child have to carry on unaided processes of metabolism in which a large part was previously taken by the mother. After birth the child is subject to a completely altered environment and to the influence of atmospheric conditions and variations. Moreover, the treatment meted out to it by mother or nurse cannot fail to influence its progress. The large majority of children passes through this initial period of extrauterine existence without difficulty. A weakly, but not necessarily unhealthy, child may receive a set back from which it takes some time to recover. It is obvious that if measures calculated to reduce loss of weight and relative loss of heat can be adopted, all children, healthy and unhealthy, will receive benefit.

In a recent discussion before the Royal Society of Medicine Professor A. Louise McIlroy stated that it was held that loss of weight in the new born during the first three days was not abnormal if it did not exceed two hundred and twenty-five grammes (half a pound).<sup>2</sup> Pembrey recently deprecated the treatment of the new born baby; he said that bathing was irrational as it entailed loss of heat. Professor McIlroy acted on the suggestion and cleaned newly born babies with olive oil instead of bathing them. She points out that babies treated in this way are just as sweet and clean as those bathed in the ordinary way. In order to effect further improvement she had the babies placed in a cot with warmed blankets and hot water bottles and kept them there until they were oiled and dressed. She gives two charts of one hundred and sixty normal babies chosen at random; their birth weight corresponded as nearly as possible with a maximum divergence of one hundred and twenty grammes (four ounces). Forty babies of *multipara* and forty babies of *primipara* were oiled and warmed and a similar number of babies of *multipara* and *primipara* were bathed. In all there was a slight initial fall in weight. In the oiled and warmed group this was not nearly so great as in the bathed group. The oiled and warmed babies regained their birth weight by the sixth day and far exceeded it by the ninth day. The bathed group had not regained their birth weight by the sixth day. Professor McIlroy concludes that loss of heat means loss of weight in the new born. In her series babies were breast fed at intervals of three hours and supplementary feeds were given when the milk supply was deficient.

<sup>1</sup> *Klinische Wochenschrift*, March 5, 1925.

<sup>2</sup> *Proceedings of the Royal Society of Medicine*, April, 1925.



## Abstracts from Current Medical Literature.

### DERMATOLOGY.

#### Melanosis Following the Administration of "Arseno-Benzol."

W. J. O'DONOVAN (*British Journal of Dermatology and Syphilis*, February, 1925) states that the long continued oral administration of arsenic is admitted to cause melanosis of the skin in rare instances. This melanosis is characterized by its wide distribution and by its association with circular white spots. Acute oral intoxication by arsenic may produce exfoliation and pigmentation. Minute doses of arsenic are sometimes sufficient for the production of melano-dermia, although as a rule prolonged absorption, medicinal, occupational or accidental, is responsible. The author reports an instance of grave and persistent melanosis after the administration of eleven doses of "Neo-Salvarsan." The condition was similar to that seen in arsenical melanosis of the face of the pre-salvarsan period.

#### Lupus Erythematosus.

ROBERT GIBSON (*British Journal of Dermatology and Syphilis*, May, 1925) reports a fatal case of *lupus erythematosus*. The appearances found on post mortem examination were typical of septicæmia. No vegetations were found on the heart valves. No focus of infection other than the tonsils was found. Careful search was made for evidence of tuberculosis, but none was found. The author draws attention to a point of interest in the case in that articular pain disappeared with the appearance of the skin eruption. He also emphasizes the almost pure culture of streptococci obtained from the tonsils and the recovery of the same organism from the blood during life.

#### Amœbiasis Cutis.

L. F. HEIMBURGER (*Archives of Dermatology and Syphilology*, January, 1925) reports an instance of *amœbiasis cutis* following on a ruptured abscess of liver. Well stained specimens of the tissue involved and smears from pus were obtained and the living state of the amœba was observed on a warm stage. Sufficient opportunity was given to study the patient day by day and to note not only the changes in the tissue reaction both macroscopically and microscopically, but also the changes occurring during the course of treatment. The two most noticeable points in treatment were the rapidity with which emetin acted and the apparent uselessness of drastic treatment with ordinary antiseptics.

#### Dermatitis.

E. D. CRITCHFIELD (*Archives of Dermatology and Syphilology*, July, 1925) writes on the subject of dermatitis caused by the "Portuguese man-o'-

war" (*Calenterata*). The dermatoses in some instances present linear petechial hæmorrhages which are sometimes associated with an urticarial swelling. When contact has lasted but an instant the hyperæmia may disappear in the course of two or three days. Where contact has lasted for a few seconds the hyperæmic line may become œdematous and raised and after the period of a few hours may become a linear vesicle varying from an inch to several feet in length. In the severer cases a coagulation necrosis may result at the end of from twelve to twenty-four hours, leaving a linear ulcerated lesion. Studies made on the poisonous properties of these linear tentacles show that extracts of the tentacles injected into pigeons produce somnolence, decreased irritability, a lowering of the temperature and finally death due to respiratory paralysis. The application of the tentacles or of their dried preparations to the skin produces a local irritation within twenty to sixty seconds. Severe injury due to contact with the "Portuguese man-o'-war" is usually followed by an elevation in temperature. Dried preparations retain their activity even up to two years, but the poisonous properties may be destroyed by heat or the action of trypsin.

#### "Flumerin."

J. C. FOX and his coworkers (*Archives of Dermatology and Syphilology*, June, 1925) give a clinical review of the value of "Flumerin" in the treatment of syphilis. The authors emphasize the absolute necessity of sustained treatment in which both arsenic and mercury is used. This is particularly important in the early stages of the disease in which the aim of therapy is not merely to arrest but to cure. "Flumerin," the disodium salt of hydroxymercurifluorescein represents an attempt to develop an organic salt which will combine the three factors of therapeutic value, low toxicity and an absence of local irritating qualities. Twenty-four patients in the New Haven Hospital were given a total of one hundred and eighty-five injections over a period of eighteen months. A freshly prepared 2% solution was always used. The general plan was to give two doses of three milligrammes per kilogram of body weight twice weekly, then two doses of four milligrammes per kilogram and lastly six doses of five milligrammes, provided no toxic symptoms ensued. "Flumerin" was found to cause rapid regression and healing of all types of secondary lesions and a somewhat slower but steady resolution and healing of tertiary lesions. Although a fairly active spirochæticidal value was established for the drug, no uniformly striking effect was made on the Wassermann reaction.

#### Sensitization.

W. F. CASTLE (*British Journal of Dermatology and Syphilis*, June, 1925) reports an instance of sensitization of the skin to sunlight followed by treatment with peptone injections and cure.

The patient had complained of intense irritation of the face and hands for ten years. Treatment including exposure to X rays had failed to give relief. Four injections of peptone were given at intervals of four days and a quinine cream was applied. After the first injection irritation ceased and the patient complained of no further symptoms even after exposing the hands to strong sunlight.

#### Purpura.

S. E. DORE (*British Journal of Dermatology and Syphilis*, June, 1925) reports an instance of *purpura annularis telangiectodes*. The lesion appeared as minute follicular, hæmorrhagic points the size of a pin's head without any inflammatory areola or thickening of the skin. The small hæmorrhagic points gradually enlarged at the periphery to about the size of a pea and formed a well defined circular macule of dark red colour. The lesion then became covered by a small scale somewhat elevated at the centre. The whole course of evolution from the hæmorrhagic spot to the scaly pigmented area lasted about a month. The lesions appeared in crops, all of which followed the same course.

#### Urticaria Solaris

L. G. BEINHAEUER (*Archives of Dermatology and Syphilology*, July, 1925) reports an instance of *urticaria solaris*, a skin reaction produced by exposure to the sunlight. The reaction was a typical urticarial wheal which could be duplicated by exposure to the ultraviolet rays of the mercury quartz lamp. Other efforts to produce this reaction failed. It is thus evident that some rays from the sun and some rays from the mercury quartz lamp were similar and produced the same reaction. As in other cases reported along similar lines the patient belonged to an "allergic family." From the data obtained the author feels certain that he is describing a specific sensitization of the patient's skin to the near ultraviolet rays.

### RADIOLOGY.

#### Radiological Investigation of Infantile Pyloric Stenosis and Pylorospasm.

CECIL G. TEALL (*Proceedings of the Royal Society of Medicine*, April, 1925) discusses the radiological investigation of infantile pyloric stenosis and pylorospasm. His communication is based on the results of the examination by X rays of one hundred and twenty children at the Children's Hospital, Birmingham. Variot goes so far as to say that radiological examination constitutes the most valuable piece of evidence in infantile pyloric stenosis. The author does not agree with Variot, but holds that radiology offers a most valuable means of confirming the diagnosis. In view of the fact that a diagnosis of pyloric stenosis involves the child in a very serious operation, it is essential to make use of every method which will make diagnosis more certain. This

is of special importance in view of the fact that pylorospasm does not call for surgical treatment. It has been claimed by some observers that bismuth meals may do harm to an infant who has no reserve power. The author cannot support this statement. In no single instance in his series was any untoward result seen. In the method adopted by the author the meal takes the place of an ordinary feed. The child is given about a teaspoonful of barium sulphate in thirty cubic centimetres (one ounce) of milk and the same quantity of water. No attempt is made to fill the stomach with barium. Sufficient only is given to act as an indicator of the rate and regularity of emptying. Spoon feeding is more satisfactory than feeding by the bottle on account of the associated freedom from vomiting. As soon as the meal has been taken a radiological examination is made with the child lying face downwards. The author is convinced that it is essential to make observations for at least three and preferably four hours. Although it is possible to differentiate clinically between pyloric stenosis and pylorospasm, radiological examination was found most helpful. The stomach in an infant with pylorospasm is not so large as that of a child with stenosis, nor is the peristalsis so pronounced a feature. It is in the type of emptying that the difference between the two conditions is most evident. Frequently during the first two hours there is less emptying in a case of pylorospasm than in one of stenosis and at this time stasis may be complete. If the examination is continued for four hours after the feed, it will be found that the stomach which two hours previously had still contained the meal, will quite suddenly begin to empty and before the examination is complete all the barium will have passed through the pylorus.

#### Radium Treatment of Carcinoma of the Cervix Uteri.

JAMES HEYMAN (*Surgery, Gynecology and Obstetrics*, February, 1925) reports the final results obtained at the Radium Home in Stockholm, Sweden, from the use of radium in the treatment of carcinoma of the cervix uteri. In comparing the results of operable tumours treated surgically with operable tumours treated radiologically several points must be borne in mind. In the first place the result with radium treatment is obtained at the expense of a very small primary mortality. Six patients among five hundred and five or 1.2% died from peritonitis or sepsis. Secondly, in a considerable number of patients suffering from inoperable tumours clinical healing resulted and persisted for at least five years. Between the years 1914 and 1918 this occurred in thirty cases among one hundred and eighty-one or 16.6%. In the third place of the remaining patients suffering from inoperable tumours, nearly 20% have been free from symptoms three years after the

beginning of treatment. Fourthly, in the majority of patients treated more or less lasting improvement has been obtained. Finally, the author concludes that radium treatment has great possibilities for further development.

#### Myelography.

J. BERBERICH AND S. HIRSCH (*Klinische Wochenschrift*, January 1, 1925) give details of the technique of the radiographic examination of the spinal cord. "Iodipin" in 10% to 25% solution is employed. Lumbar puncture is performed with the patient on the side and the pelvis raised. Five to ten cubic centimetres of cerebro-spinal fluid are allowed to escape and four to six cubic centimetres of "Iodipin" solution slowly injected. If the upper part of the cord has to be examined the injection is given in the suboccipital region. Air may also be injected to obtain a better contrast. After removal of the cerebro-spinal fluid two cubic centimetres of "Iodipin" are injected and then fifteen to thirty cubic centimetres of air followed by the remainder of the "Iodipin." No injury of the meninges has been noted. In twenty cases in which air was injected, there have been complaints of pain and paræsthesia of the extremities.

#### Cholecystography.

SHERWOOD MOORE (*American Journal of Roentgenology*, June, 1925) states that cholecystography consists in the visualization of the gall bladder, rendered opaque to the passage of X rays by substances excreted into it in the bile. The most satisfactory dye employed is the sodium salt of tetrabromphenolphthalein. The patient with symptoms of gall bladder disease should not fail to undergo an opaque meal examination of the alimentary tract. Since the signs of disease of the structures of the right upper abdominal quadrant are so often not clear, the best results will come from an X ray examination of the gall bladder and a gastrointestinal examination, to be followed by cholecystography. A normal gall bladder will begin to cast a shadow from three and one-half to five hours after the injection; will show a tendency to change in size, will cast its heaviest shadow between sixteen and twenty-four hours and empty in about forty-eight hours. The shadow seen on the four and eight hour plate is almost invariably larger than the subsequent shadows.

#### Gastric Diverticula.

A. F. HURST (*British Journal of Radiology*, B.I.R. Section, January, 1925) considers the question of gastric diverticula with special regard to the possibility of error in the diagnosis of gastric ulcer. Such diverticula are very rare and are invariably situated in the immediate neighbourhood of the cardia. Keith considers these diverticula to be acquired and not congenital. They are usually about the size of a cherry and the walls are

formed of mucous membrane with often an incomplete layer of muscular tissue. Only four cases have been reported as having been diagnosed during life. They give an appearance very like a large gastric ulcer niche.

#### Lateral Radiography of the Lumbo-Sacral Region.

L. T. LEWALD contributes a paper on lateral radiography of the lumbo-sacral region (*American Journal of Roentgenology*, October, 1924). The technique employed is as follows. For an average sized man the following are required: A spark gap of 19.3 centimetres (seven and three-quarter inches), fifty milliamperes current and a target plate distance of sixty centimetres (twenty-four inches), with an exposure of two seconds. A Potter Bucky diaphragm and super-speed films are used. The author points out the rarity of demonstrable pathological changes in case of injury to the lumbo-sacral region, but says that anomalies are notoriously common in this region. Some observers consider that such anomalies tend to weakness and greater liability to symptoms following injury. In anatomy textbooks sufficient deviation from the perpendicular is not portrayed; the deviation is usually 45° instead of 32° as stated in textbooks. The angle varies, however, in different individuals and at birth is a very small one. The diagnosis of lumbo-sacral dislocation should never be made from antero-posterior skiagrams alone. In medico-legal cases, no matter how severe the trauma, the radiologist should guard against the assumption that the trauma has produced the variation from the usual anatomical appearance.

#### Radiographic Diagnosis of Chronic Appendicitis.

A. G. SCHNACK (*American Journal of Roentgenology*, May, 1925) writing of the radiographic diagnosis of chronic appendicitis says that an appendix that does not produce the usual "reflex" X ray findings has very little to recommend it as a source of danger. These findings may be briefly mentioned as pylorospasm, duodenobulbar spasm, erratic and definite degrees of reverse peristalsis in the small bowel, a tendency to a delay in the emptying of the stomach, ileal delay and often a definite degree of spasticity of the transverse and descending colon. To these "reflex" findings must be added the local signs of a tender appendix often with pain radiating to different parts of the abdomen during palpation of the appendix, irregularities of the contour, definite kinks, bulbous appendix tip, local dilatation of the appendix, fixation, evidence of adhesions to neighbouring organs, such as the duodenum, caecum and so forth. The history and subjective symptoms must also be considered. Because of the effect of appendiceal irritation on the remainder of the bowel "spells of indigestion" after indiscretions in diet are frequently found.



## Medical Societies.

### THE MELBOURNE PÆDIATRIC SOCIETY.

A MEETING OF THE MELBOURNE PÆDIATRIC SOCIETY was held at the Children's Hospital, Melbourne, on July 8, 1925, Dr. H. DOUGLAS STEPHENS in the chair.

#### Physical and Mental Testing.

PROFESSOR R. J. A. BERRY gave a demonstration of the technique of physical and mental testing and the diagnosis to be based thereon. He opened his remarks with a series of questions and answers with reference to amentia. In the answers to these questions Professor Berry said, in effect, that in the Children's Hospital the early diagnosis of amentia and its correlation with the underlying neurological factors as enunciated by Bolton, Watson and Mott was being attempted.

The term amentia was applied to connote the mental condition of patients suffering from deficient neuron development (J. Shaw Bolton). The subjects of amentia suffered, as could be proved both macroscopically and microscopically, from a more or less definite grade of sub-evolution of the cerebrum. It was desirable to attempt an early diagnosis of amentia for several reasons. Firstly, because the ament seldom reacted normally to his surroundings and might develop depending on his environment markedly antisocial tendencies, such as crime and prostitution. He was a social menace. Secondly, because he was an early prospective victim to such mental disorders as epilepsy, hysteria, *dementia præcox*, neuroses of various kinds and of psycho-neuroses. Thirdly, because he was not a good subject for surgical operations. Fourthly, because it was unfair for normal children to be brought up alongside aments. Fifthly, because the Victorian Government was about to introduce a bill to deal with mentally defective persons and the onus of diagnosis would be thrown upon the medical profession.

The commoner forms of behaviour presented by the ament included general mental dulness and apathy, a lack of initiative and often an indifference to his surroundings; a definite degree of stereotypism of all the mental processes exhibited; an inability to learn new acquirements; a mechanical method of performing known acquirements; a lack of prudence and foresight and a general stupidity and inability to understand any attempts at correction.

In certain cases and in addition there was a complete lack of control over the sexual appetites and functions and/or an inability to distinguish between *meum* and *teum*. There was also a lack of will power and a tendency to succumb easily to wrongful suggestion.

The clinical varieties of amentia included not only idiots and imbeciles, but also a large number of persons who exhibited a milder degree of cerebral underdevelopment and of mental deficiency than the imbecile. These formed a connecting link between the mildest type of imbecile, the so-called mental defective, and the ordinary normal sane individual.

Amentia was thus subdivided into low grade amentia and high grade amentia. Low grade amentia included idiots, imbeciles of all grades with or without epilepsy. High grade amentia included mental defectives or morons, immoral, unstable and excited persons, cranks and asylum curiosities, persons suffering from recurrent conditions of all types and those suffering from hysteria, epileptic insanity and true paranoia.

All those types due to some obvious physical defect, such as cretinism, mongolism and the like, were easily recognizable by any clinician.

Those due to faulty development of the cortical neurons and neuroblasts and not to disease thereof, were not so recognizable and required special methods for their diagnosis. These special methods were being tried in the hospital. It was to be noted that these special methods would not only aid diagnosis of both the physical and developmental types, but would do so with a degree of accuracy which was impossible by any other method. They would

also indicate the amount of cerebral retardation which was present. Ordinary clinical methods, on the other hand, would fail to detect the developmental types and would further fail to indicate the degree of retardation in the physical types. It was important for the medical profession to be familiar with these special means of diagnosis because of the very real danger of allowing the subject to pass into the hands of unskilled laymen and because of the certainty that an act would shortly become law and this law would expect and demand certain duties from the profession in this matter.

That the excellent and proved medical methods of examining a patient with nervous disease were largely physical could be demonstrated from the perusal of almost any modern textbook on the subject. Campbell Thomson, however, thought that the advances which experimental psychology had made in recent years, rendered it possible to bring many of its methods into common clinical use, always provided that such methods were regarded as an addition to existing physical methods and not as a substitution therefor.

Within the last few years there had, however, arisen a school of lay psychologists with little or no knowledge of the structure and functions of the nervous system who had devised quite a large number of mental or "intelligence" tests. These were apparently regarded as being infallible guides in the diagnosis of cerebral amentia, a view with which no medically trained man could agree. Some of this "psychological" literature was from a neurological standpoint mere ephemeral rubbish. Nevertheless, the more reputable and less extravagant of this literature, particularly that dealing with experimental psychology, was altogether admirable and well worth the most careful attention of the medical profession.

Even as thus restricted the field for choice became still further narrowed if only that was admitted which conformed to the following criteria: The scientific training of the investigator; the scientific character and practicability of the investigations or suggested mental tests; the standardization of the tests from a sufficiency of observation on sufficiently large groups of living human individuals; the applicability of the proposed tests to the human brain as the organ of mind and their subsequent substantiation where possible by *post mortem* histological investigation.

There were but few mental or "intelligence" tests which conformed to these essentials, but nevertheless the medical profession was not asking too much from experimental psychology when it demanded the standards of ordinary research, particularly when it was suggested that some of the better known of these methods should become part and parcel of a clinical neurological examination.

Professor Berry then described in detail the special methods of diagnosis which he employed at the hospital.

The medical method consisted almost entirely in a physical examination of the central nervous system, particularly of the segmented portions of that system and the well established long conducting neurons. It sought to correlate the results with the general physical condition of the patient. Its methods were standardized throughout. Relatively little or no attempt was made to estimate the patient's mentality or to correlate that mentality with the state of development of the cerebral cortex. When this was underdeveloped it had or might have a profound influence on the particular disease from which the patient was suffering, as also upon his social reactions to the environment; hence the importance of endeavouring to overcome this weak spot in the medical conduct of a neurological examination.

The psychological method consisted almost entirely in a mental examination of the suprasegmental portion of the central nervous system, particularly of the cerebral cortex, but most usually without adequate knowledge of the structure and function concerned. Not infrequently little or no attempt was made to correlate the results with the general physical condition of the patient, with the state of development of the central nervous system or with any functional or organic disease. With few exceptions its methods were not scientifically standardized and hence were not of the utility they might be.



As a result of a prolonged laboratory and clinical experience it was suggested by Professor Barry that to current clinical neurological methods there should in many cases be added on the following: Estimation of the cubic capacity of the brain; estimation of the standing and sitting stature and the weight; estimation of the grip and vital capacity; estimation of the mental reactions by the Binet-Simon and Porteus maze tests.

The individual results obtained under each one of these observations were compared with the percentile table for the appropriate age and sex group and there was thus obtained an accurate record of the patient's approximation to the normal or the extent to which he departed from that norm. If the latter was very pronounced the information so obtained combined with the complete clinical, personal and hereditary history and the other ordinary clinical observations, would very frequently throw an extraordinarily interesting light on the patient's mentality, as also on the state of development of his cerebral cortex. The exact method of recording the patient's position in the percentiles would be shown in the clinical cases to which he intended to refer.

The object of the estimation of the patient's cubic capacity of brain was to obtain some idea of the relative state of development of the cortical layers of the brain and to ascertain when possible how far this development coincided with that revealed by the other avenues of approach. It was known that cerebrally abnormal individuals tended to have abnormal heads.

The instruments required were a pair of Flower's or other head callipers and a Grey's or Cunningham's radiometer.

The head measurements recorded for the purposes of the subsequent calculation of brain capacity were the maximum head length, the maximum head breadth and the head height, taken in the following manner.

The maximum head length was measured from the most prominent point of the glabella to the most distant point in the middle line on the back of the head, known as the occipital point. The observer stood on the left side of the person being measured and the fixed point of the callipers was first applied to the glabella and held there by the fingers of the left hand, while the other point was moved over the midline of the back of the head (occiput). It was necessary that care should be taken to observe that the fixed point had not been moved off the glabella during the measurement and that the points of the callipers had not been deflected from the median vertical plane. The pressure of the points of the callipers on the head should be as much as could be comfortably borne by the person under examination. This diameter was recorded by means of Flower's or similar callipers.

The maximum head breadth was measured wherever it could be found above the plane of the ear holes. The callipers should be held in a vertical transverse plane and moved about until the maximum diameter was ascertained, the observer being careful to keep the points of the callipers exactly opposite to one another. The pressure of the points on the head should be as much as could be comfortably borne by the person under examination. This diameter, like the previous one, was recorded by means of Flower's or similar callipers.

The head height was measured from the midpoints of the ear holes to the highest point of the cranium measured in a vertical plane when the eyes were directed to the horizon. This diameter was measured by means of Grey's or other radiometer.

The recording of these measurements, as well as all those which followed, the necessary calculations and the placement of the observations in the correct age and sex percentiles could be carried out by any intelligent nurse or professional assistant after a comparatively short period of training. This was the more necessary inasmuch as the examination took some little time and their practice was to employ an assistant for this purpose. The assistant undertook this portion of the examination, whilst the medical man was questioning the relatives in regard to the history of the patient. If the patient was an unaccompanied adult, then the examination was divided

into two parts. For the purposes of accuracy and with the further object of eliminating the personal error, it was advisable to have all these special observations uniformly recorded by the same individual.

The calculation of the cubic capacity of brain was made from the recorded length, breadth and height diameters for both males and females by means of the following formula:

$$\text{Brain capacity} = 0.000337 \times (L - 11) \times (B - 11) \times (H - 11) + 406.01.$$

Supposing, as an example, a child aged ten years and six months, a child in the eleventh year of life, was found to have the following head measurements:

Maximum head length, 180 millimetres; maximum head breadth, 140 millimetres; head height, 120 millimetres. From each of these measurements eleven millimetres were subtracted. This was the allowance an extensive series of observations had shown, should be made as the average thickness of skull and scalp. This gave 169 millimetres, 129 millimetres and 109 millimetres respectively. Then it was necessary to proceed as follows:

$$\begin{array}{r} 0.000337 \\ 169 = \text{Head length} - 11. \end{array}$$

$$\begin{array}{r} 0.056953 \\ 129 = \text{Head breadth} - 11. \end{array}$$

$$\begin{array}{r} 7.346937 \\ 109 = \text{Head height} - 11. \end{array}$$

$$\begin{array}{r} 800.816133 \\ 406.01 \\ \hline 1,206.8 \end{array} = \text{The cubic capacity of brain.}$$

Notwithstanding the apparently formidable appearance of the calculations they were quite easily made in a short time and with but little practice by any ordinary assistant of ordinary intelligence. They were still more easily made by a calculating machine.

The cubic capacity of brain in the aforementioned hypothetical case was in round numbers 1,207 cubic centimetres for a child supposed to be in the eleventh year of life. This was then compared with the percentile brain capacity of his year, sex and status. If he was a State school child, reference to the suitable percentile table showed him to be about the 12 percentile, whereas if he were a normal child he should be at or about the 50 percentile. A danger signal was thus held out to the medical observer that possibly this child was cerebrally underdeveloped. Further reference to the median or 50 percentiles showed that this child only had the cubic capacity of brain of a normal child in the sixth year of life, in other words, he was about five years retarded in his head growth. As head growth was very largely determined by brain growth and as brain growth had been shown to be largely influenced by medullation of axons without which the neuron was incapable of functioning, it appeared to be not improbable that some singularly useful information had been obtained regarding this child.

The cubic capacity was then recorded on the chart and the exact percentile position of the patient indicated thereon, but no deduction was to be drawn from the observed facts until the whole examination was completed.

Although this procedure was rather more complicated than the simpler one of running a tape measure round the patient's head, it had long since been scientifically demonstrated that no useful purpose was to be gained by circumferential measurement which should disappear from clinical practice. Circumferential head measurements were quite worthless.

Estimation of the standing and sitting stature and the weight had long formed an essential part of the clinical examination of patients, but it had recently been shown by Doll, confirmed by other observers, that certain anthropometric measurements had a decided diagnostic significance in the mental examination of an ament, and for these reasons, supported and confirmed by clinical

observations, the measurements of standing stature, sitting stature and weight should always be recorded.

The procedure was as follows: The standing stature was recorded by means of a stadiometer or height stand in the metric scale. The subject should remove his boots and stand on the stadiometer with the heels together and with heels, buttocks, spine between the shoulders and head all in contact with the measuring rod. The chin should not be unduly raised or depressed. The examiner should then bring down the sliding arm of the instrument until it rested squarely but without excessive pressure upon the subject's head. The result was recorded in the chart and the percentile position of the patient, having been located from the appropriate table of standing stature percentiles, was also noted on the chart.

Doll had stated that a decided qualitative symptom was often found in the manner in which the cerebral ament stood up to the stadiometer. It was expressed by the stoop in the knees, the flat feet, the poor physical tone, the round shoulders and the sharp inclination of the chin in holding up the head. Many faced the measuring rod or placed their feet astride the base board. The normal intelligent child on the contrary seemed at once to know what was wanted and backed himself against the measuring rod with military erectness. The aments of all grades were often below normal in standing height. There was a definite dependence of the degree of subnormality upon the degree of amentia. The higher mental types—the morons (high grade aments)—approximated the normal. The aments not only grew at a retarded rate, but also ceased growing at an earlier age. Of those examined by Doll, only 30% attained the normal average of standing stature. Although comparative standing stature could not be seriously considered in diagnosing mental defect, it was confirming evidence when found in combination with other symptoms in determining defect, since only one-third of all aments approximated to normal measurements.

The sitting stature was recorded in exactly the same way as the standing stature, except that the subject sat erect upon the stand of the stadiometer with the spine and head in contact with the measuring rod. If it was impossible for the subject to sit upon the stadiometer, then he should be placed upon a chair, the height of which was known, and the height of the chair should be deducted from the height of the chair and of the subject. An even simpler method was to get the patient to sit upon the ground and record the stature in that position in the usual way. The record should be made in the metric scale, compared with the corresponding position on the percentile table for sitting stature and recorded upon the chart. The aments of all grades were often below normal in sitting stature. The highest types—the morons (high grade aments)—approximated the normal average. Sex differences in average sitting stature were negligible. Sitting stature was consistently more subnormal than standing height. Of all aments 75% failed to reach the normal average in sitting height. This gave a fairly high diagnostic value (Doll).

The general purpose of determining the weight was similar to that of determining the standing and sitting stature, namely, to furnish a comparative index of physical size or growth as a basis for correlation with other tests or observations. About 43.4% of the total body weight was produced by muscles. There was also a probable correlation between body weight and brain weight, though this had not yet been fully worked out.

The apparatus required was an accurate scales, preferably of the type specially devised for anthropometric work, which allowed readings to be rapidly and accurately taken in the metric system with units of fifty grammes or twentieths of a kilogram.

For very accurate measurements the weight should be taken without the clothes. Where this was impracticable, weight should be taken with the clothes and without the boots and one-twentieth should be deducted from the total weight as the weight of the clothes. The weight should be recorded in the metric system and the results compared with the percentile tables and duly noted on the chart.

Taken alone weight had but little value in the diagnosis of amentia, but had some value in the lower ages. Approximately 40% of all aments reached the normal average, but this chiefly affected the higher types of deficiency. When combined with the other observations, weight had some diagnostic significance.

The physical average was the average of the percentiles for standing stature, sitting stature, the weight. It was obtained by adding together the three percentiles and dividing by three. The resultant figure was the physical average which was noted in the chart and placed in the graph in the correct position. Of all aments 75% failed to attain the normal physical average which would be represented by the fifty percentile. The diagnostic value of the physical average was greater for low grade aments than for high and was even greater still when read in conjunction with the psycho-physical average.

The observations made under the heads of estimation of the grip and vital capacity were collectively sometimes termed the psycho-physical tests, in opposition to the purely physical measurements of stature and weight. The psycho-physical tests were three in number: Estimation of the right grip; estimation of the left grip; estimation of the vital capacity.

They were employed because, although all three were primarily physical tests, yet they were to a certain extent controlled by the nervous system. They were, therefore, valuable corroborative evidence of the relative value in the individual of the brain capacity and the physical tests. The grip tests were also employed as an index of general bodily strength, as an index of right or left handedness and for general comparative purposes.

The right and left grips were estimated by means of the improved form of Smedley's dynamometer with the metric scale in kilograms. To suit the instrument to the subject's hand the examiner adjusted the movable stirrup by trial and error, so that when the hand was loosely flexed and ready for the pull, the instrument lay squarely in the palm, facing upwards, with the outer frame set firmly against the fleshy base of the thumb and the inner edge of the stirrup touching the second phalanges of the fingers.

Three trials should be allowed with each hand, right and left, alternatively, but a brief pause, say of ten seconds, should be introduced between each trial in order to avoid excessive fatigue. The subject should be induced to make his best effort. The amount registered at each trial should be recorded, but for ordinary purposes the highest reading obtained for each hand only should be recorded on the chart.

There was considerable value in observing the reaction of the subject to the test in question, the awkwardness of the hands, the enormous effort without appreciable result, the facial distortion and the spasmodic bodily movements. Low grade aments who easily managed to wheel heavily loaded barrows or to lift exceptionally heavy weights, frequently failed very badly at this test and did not often grip ten kilograms. In the former case they were using the powerful muscles of the back and legs, in the latter they were asked to concentrate on the particular effort and this the underneuroned ament was often quite unable to do. Strength of grip had, therefore, a high diagnostic value, inasmuch as 90% of aments failed to reach the normal average.

The vital capacity, also known as the breathing capacity and the differential capacity, was the maximal volume of air that could be expired after taking a maximal inspiration. It was not identical with lung capacity, because a certain amount of air, termed the residual air, always remained in the lungs.

The vital capacity was an important index of general physical condition and capacity. It was affected by sex, age, posture, stature, occupation, amount of daily physical activity and by disease. It might be increased by various forms of physical exercise which demanded active respiration.

When breathing quietly a man took in and gave out at each breath about five hundred cubic centimetres of air, measured dry and at 0° C. If measured moist and at the



temperature of the body, namely  $37^{\circ}\text{C}$ , the volume would be about six hundred cubic centimetres. This amount was known as the tidal air. By means of a forcible inspiratory effort it was possible to take in about one thousand five hundred cubic centimetres more (complemental) air. At the end of a normal expiration a forcible contraction of the expiratory muscles would drive out about one thousand five hundred cubic centimetres more (supplemental) air. These three amounts together constituted the vital capacity of an individual. This total might be determined by means of the instrument known as the spirometer, which was merely a small gas meter with a gauge by which the amount of air in it could be read off at once. The person to be tested filled his lungs as full as possible and then expired to the utmost into the spirometer. The air left in the lungs after the most vigorous expiration was known as the residual air (Starling).

The apparatus required was a spirometer, preferably of the wet type, fitted with detachable wooden or glass mouthpieces with extra mouthpieces.

In recording the vital capacity of a person care should be taken that the subject's clothing was perfectly loose about the neck and chest. He should be instructed to stand upright, to take as full an inspiration as possible and then to blow all the air he could, not too rapidly, into the spirometer. He should also be cautioned to take care that no air escaped about the mouthpiece. Two or three trials might be allowed and the best reading recorded. As with all the other observations the result was to be compared with the correct percentile table and the patient's percentile position duly noted.

Doll had stated that this vital capacity offered much greater difficulty to mental defectives than the others. The typical low grade aments were unaccountably timid in the experiment and often refused to approach the instrument. Ordinarily they would yield to a little coaxing or cajolery, but might become excited at any insistence. It was often necessary to give very careful instructions supplemented by a personal demonstration as to the method of performing the experiment. Preliminary inspiration and expiration without the tube was often advisable before a record was taken. The mentally defective child not infrequently blew around the mouthpiece instead of through it, held the mouthpiece in a helpless or stupid fashion, blew through the nose, stopped the mouthpiece with the tongue, blew oftener than once and re-inspired from the instrument. It was remarkable how almost unfailingly the record of the ament was below normal and in most cases far below normal in the spirometer test.

As with strength of grip, so also with vital capacity, all aments tended to be much below normal. Vital capacity was, therefore, highly diagnostic of amentia and also of the degree of amentia. Considering that vital capacity showed the greatest subnormality of all these measurements, that it showed the least dependence upon height and weight and a high correlation with mental age and that only 8% of all aments reached the normal average, it could safely be taken as a significant, reliable, single index of mental incapability.

The psycho-physical average was obtained by adding together the individual percentiles of right grip, left grip and vital capacity and dividing the product by three. The resultant figure was then placed opposite the appropriate place in the chart.

Just as the physical average presented some advantages over the individual physical percentiles for standing stature, sitting stature and weight, so also was the psycho-physical average most usually of greater value than the individual percentiles for right and left grip and vital capacity. Taken alone the psycho-physical average had a highly diagnostic value, higher than any of its individual components. Only 7% of aments reached the normal average and the correlation with mental age was quite high.

The so-called "intelligence" tests were legion, but as few of them complied with all the conditions laid down previously, the choice was necessarily restricted to two well known and quite different lines of tests which complied with the conditions. Both series of tests had been widely tried on many thousands of children and adults

in different parts of the world and were so well established as to need no words to commend them.

As employed for clinical purposes these tests should not be regarded as "intelligence" tests at all, but as an indication of the mode of the reaction of the individual to his environment. Combined with all the other avenues of approach to the problem, they undoubtedly proved their value, though it could not be too strongly urged that diagnoses of mental inefficiency should not be based (as was far too frequently done) on Binet-Simon tests alone. In fact there was no single test which permitted by its sole use of such a diagnosis being made.

As regards the Binet-Simon tests, Professor Terman's Leland Stanford revision of the original tests as set forth by him in the last edition of his book, "The Measurement of Intelligence," might be employed. Full instructions as to the application of these tests and their significance would be found in Professor Terman's work.

These well known tests comprised an age graded series of tests of observation, vocabulary, weights and numbers, comprehension, drawing and reasoning. Many of them were largely tests of acquired knowledge. In other words the child who had not received a certain modicum of education, would not obtain the same standard of success as the child who had. To this extent, therefore, these tests were not so much a measure of amentia as of acquired knowledge. This notwithstanding, the ament would fail at the tests to a greater extent than would the normal child. Others of the Binet-Simon tests were purely neurological in character, those, for example, dealing with the arrangement of concealed weights were a test of the stereognostic sense. If the neurons in that part of the parietal lobe concerned in stereognostic perception were deficient in their numbers or development the child or adult would certainly fail in these tests. Broadly speaking the Binet-Simon tests applied more particularly to the incoming receptor system, especially with those exteroceptor senses of sight and hearing upon which education so largely depended.

The Porteus maze tests on the other hand were largely tests of the effector mechanism. To succeed in the tests the patient must be able to control the muscular mechanism of his hand and fingers. He must also exercise a certain amount of prudence and foresight to find his way through the mazes. This the mentally defective child could not do, nor could he control the use of the finer movements of his fingers, so notwithstanding the apparent simplicity of these tests the under-neuroned individual usually failed. These tests had been worked out by Mr. S. D. Porteus on many thousands of children in Victoria and had since been fully confirmed and standardized by him in his more recent capacity as Director of Research at the Training School, Vineland, New Jersey, United States of America, where full information as to these tests might be obtained.

The results obtained from the use of these two series of tests might be recorded on the chart in one or other of two ways, either as an "intelligence quotient"—usually briefly referred to as the "I.Q."—or in the form of percentiles, which had been worked out by Porteus for both the Binet-Simon and his own tests. As the former practice had up till that time been the more usual, it had been retained. As a general rule the Porteus intelligence quotient read higher than the Binet-Simon for normal children, but if the combined intelligence quotient fell below the figure 75—especially when the other avenues generally agreed—it was a pretty certain indication of a lack of development of cortical neurons. Those familiar with histological work on the cortex could thus be reasonably certain of their diagnosis and could predict with a considerable degree of certainty the probable reaction of the individual to his environment.

In both series of tests the mode of calculating the intelligence quotient was obtained by dividing the patient's mental by his chronological age. The resultant figure was the intelligence quotient. Normality was indicated by the figure 100 and the range varied from 30 or 40 for low grade amentia (in some it was even zero) to about 150, the latter indicative of very high intelligence.



Regarded as a supplement to the ordinary clinical neurological examination and not as a substitute therefor, the method described would be found of undoubted utility. It was to be regarded as the absolute minimum upon which a diagnosis of cerebral underdevelopment should be founded and if it could be supplemented by additional standardized mental and physical tests, it would be all to the good. Even in its minimum form as just described the examiner sought to obtain an accurate personal and clinical history in addition to the precise measurements and tests. This inquiry was directed along two main lines: One, was there any ascertainable cause for the underdevelopment of the neurons? Two, how was the patient tending to react to his present environment?

Amongst the possible causes of amentia, to the elucidation of which inquiry should be specially directed, might be mentioned the following, though it should be distinctly understood that with the exception of heredity some of them were very problematical as possible causes.

Heredity was by far the most frequent and the most potent predisposing cause of nervous and mental disease. What the patient inherited was perhaps not so much a disease as an unstable or imperfectly developed nervous and cerebral system. In cerebral amentia the influence of heredity was so potent that even if only one parent was cerebrally retarded, the children would rarely be up to standard. Where both parents were defective there was no escape.

As regards the parents drunkenness of a chronic character might possibly manifest itself in the offspring in the form of idiocy, imbecility and epilepsy. The children of such debased stock were apparently born with a defective nervous organization and such weak inhibitory will power as to make them fall an easy prey to social temptations. That congenital syphilis was a cause of arrested neuronic development was undoubted.

Of prenatal conditions it would appear as not improbable that improperly applied forceps or a very prolonged or difficult labour might do irreparable damage to the delicate neurons of the brain, possibly by causing a subdural hemorrhage. Unsuccessful attempts to procure abortion and the use of abortifacients might also act injuriously on the developing neuron.

Of the postnatal causes of cerebral amentia might be mentioned as possible factors insufficient or improper feeding during infancy, febrile diseases during early childhood, traumatic injuries to the head and bad hygienic conditions, particularly an insufficiency of oxygen, as well as toxemias and bodily poisons generally. The neuron was peculiarly susceptible to deprivation of oxygen.

Inquiry should here be specially directed to reactions to the environment of an abnormal character as well as to any average or higher abilities possessed by the patient.

Recent research into the histology and functions of the cerebral cortex had shown that the infragranular cortex was largely concerned with animal reactions on which the supragranular cortex was inhibitory. If, therefore, the examination tended to show that the patient's brain was underdeveloped, it was a matter of practical certainty that it must be the supragranular brain which was the more backward and subsequently the patient's reactions to the social environment would be more nearly on the animal plane of acquisition and uncontrolled displays of sex. In the human being the way in which these reactions ultimately displayed themselves, depended not only on the state of development of the cortical layers of the brain, but also on the environment itself. If the latter had tended to encourage antisocial reactions, the patient's behaviour would also be largely antisocial. If, on the other hand, the patient's surroundings had discouraged such reactions, they would be modified accordingly. When the adult body with its adult instincts was coupled with the undeveloped brain and intelligence and weak inhibitory powers of a ten year old child, the only possible outcome, except in those cases in which constant guardianship was exercised by relatives and friends, was some form of delinquency. This delinquency most usually assumed one or other of two main forms—either uncontrolled sexual or homosexual gratification—or some form of moral delinquency, such as thieving, lying, slander. Professor

Berry asked his audience to observe how this coincided with the known functions of the two great cortical layers of the brain and with the proved figures of the incidence of crime and prostitution amongst cerebral aments.

Professor Berry said that the method of examination suggested by him as an essential minimum addition in the mental examination of a neurological patient constantly sought to correlate the observed clinical facts with the state of development of the cerebral cortex and was apparently the only practical method which made this attempt. Further, it was based throughout on an extensive series of laboratory and clinical investigations. Firstly, the method of inquiry was correlated throughout with the cortical investigations of Bolton, Watson, Mott and others, fully checked and confirmed by the histological appearances of the cortex as observed and measured after death on patients whose antisocial clinical history was known. Secondly, it was based on the examination of more than ten thousand living individuals by Berry and Porteus with the foregoing investigations constantly in view. A third basis was the physical examination of many thousands of children and adults by Doll, Smedley and others. A fourth basis was the many thousands of mental examinations made in almost all parts of the world by observers on the Binet-Simon and Porteus tests. Lastly, it was based on clinical experience, to which in conclusion attention might be directed.

Professor Berry then showed several individuals as selected clinical examples with their charts and neurological interpretation.

Dr. W. A. T. LIND congratulated Professor Berry on the most excellent demonstration he had given. Dr. Lind described it as a most complete attempt at arrangement of mental tests.

He was particularly interested in the estimation of the power of grip in these patients. He had not seen this done quantitatively before, although he had often noticed that in *dementia præcox* patients would hold out the hand, but had no grip at all. In melancholia on the other hand it seemed that the small muscles of the hand were mostly affected. This was interesting in view of the fact that melancholia was the form of mental deficiency nearest to normal and that with it the finer movements were the first to be affected. In mania, for instance, it was the larger muscles of the arm which were most affected.

Referring to weight, Dr. Lind said that in his experience most aments were either dwarfish or below the normal weight. Epileptics also were generally small in stature.

Dr. A. P. DERHAM spoke of his practical experience at the State Children's Depot at Royal Park with a large number of defective children and quoted several cases as a corollary of Professor Berry's demonstration of the technique of the investigation. Professor Berry had been testing the Depot children for more than two years in an honorary capacity and it was found that a fairly high percentage of delinquent children and neglected children were mentally defective—roughly 20% of the inmates.

In testing Professor Berry's diagnoses with the opinions of the magistrates in the children's courts, the clinical findings of the medical officer and the educational tests of the school teachers, it was found that Professor Berry's findings gave the most valuable guide to the social efficiency of the child in question and in some instances had prevented mistakes being made in the disposal of children.

The problem of disposal of the adolescent defective wards of State was a very serious one. They were herded in unsuitable institutions in contact with mentally normal children and at the age of eighteen or twenty were allowed out in the world to drift eventually into the gaols or asylums or worse.

While considering Professor Berry's method essential to an adequate estimation of mental development, Dr. Derham thought that in the hands of less experienced and conservative investigators than Professor Berry the method in some cases might be misleading in that it was difficult to estimate the effects of time and environment.

Dr. H. BOYD GRAHAM referred to the practical value of these investigations in the work of the hospital and especially with reference to the effect of diseased conditions on these children. He had frequently noticed in mentally defective children that any acute infective illness had a more severe and lasting effect than in normal children.

Dr. Graham then quoted the case of a child who had come to hospital suffering from osteomyelitis and chronic septicaemia. This patient had always been regarded as normal by her parents, but the tests had revealed gross subnormality. After treatment of the bone condition and removal of the infective process a subsequent test had revealed that the child was then quite up to the normal standard.

Dr. R. R. WETTENHALL stated that he was extremely interested in Professor Berry's demonstration and he wished to raise the question as to whether facilities for such investigations were available to the private practitioner or were they limited to hospital patients.

Dr. H. DOUGLAS STEPHENS joined with previous speakers in congratulating Professor Berry on the very interesting and instructive demonstration that had been given. Dr. Stephens said that he thought Dr. Derham's remarks raised the question of the utility of the children's courts. From his observations it seemed that a child was often tried for an offence, subsequently released and immediately committed a similar offence; there seemed to be no cure. Dr. Stephens asked whether Dr. Derham could suggest any means of cure or prevention in these cases and whether he considered severe punishment of any avail in the case of moral imbeciles.

In answer to a question by the Chairman in reference to mental deficiency among delinquent children brought before the Children's Court, Dr. DERHAM said that the recently published statements by the President of the Children's Court and by the late Attorney-General that mental deficiency was not a common cause of juvenile delinquency were certainly mistaken. The fact was that mental deficiency was sometimes not recognized by the Children's Court and was common among boys committed by the Court to various institutions. The result was that in one crowded institution were herded together ailments of criminal type with boys of various ages whose delinquency depended chiefly on high spirits and parental neglect. Dr. Derham suggested as a partial cure that the Children's Court should have available the services of a clinician and also a mental specialist, the former to report whether the delinquency could have been caused or predisposed to by physical defect and the latter to say whether the culprit was mentally responsible and to recommend as to his or her disposal. There should then be available various institutions suitable for the reformation of various classes of boys—the segregation colony for the mental defectives, the farm colony and the service home on probation for the delinquent boys of better type and normal mentality and the juvenile penitentiary or reformatory for the boys of confirmed criminal tendencies to whom appeal could only be made by definite punishment. The Royal Park Depot would always be necessary as a clearing house and observation depot, but it should not be used for any other purpose. To send boys of all these various types to one farm colony as proposed by some enthusiasts would lead to an inevitable disaster.

PROFESSOR BERRY, in reply, said he was pleased to see the number of sides to the question which had been raised by the discussion. With regard to the influence of time and environment in association with mental deficiency, the general opinion was that if from the age of ten years onwards the child was found to be three years retarded, that patient could never again catch up to the normal.

Brain growth ceased earlier than was usually supposed and a careless observer would often mistake chronological growth for mental growth. There was no provision whatever for changing the environment of these children; if a proper institution for this purpose existed, some improvement might be obtained. He was pleased to hear Dr. Graham direct attention to the alteration in mentality during a severe illness. The neuron was a very delicate structure, easily affected by toxemia from various causes, such as constipation or even after a general anæsthetic,

so that even a normal individual could easily become an ament temporarily during the course of a severe infection.

The application of this work to private patients was the weak link in the chain. The only solution of the difficulty was to have a medical officer set apart for this work and a trained assistant to carry out the tests used for aiding the diagnosis. With reference to punishment for moral imbeciles Professor Berry considered it futile to try and make any impression on these individuals. A normal person was aware of the ordinary social laws and appreciated the difference between right and wrong, whereas a moral imbecile was quite incapable of understanding any such distinction and severe punishment did not help in the slightest degree. Finally, he considered the procedure in regard to the Children's Court as lamentable.

Professor Berry considered that an expert practitioner should be attached to the Children's Court and the children should be graded according to sex, type of mental defect and especially according to age. Children below the age of puberty should certainly be kept apart from those above that age.

On behalf of the Society Dr. STEPHENS thanked Professor Berry and his assistant, Miss L. Barling, and the meeting closed.

## Obituary.

HENRY CHARLES CADELL RENNIE.

We regret to announce the death of Dr. Henry Charles Cadell Rennie which occurred at Victor Harbour, South Australia, on August 28, 1925.

CHARLES ST. LEGER WILLIS.

It is with regret that we announce the death of Dr. Charles St. Leger Willis which occurred at Bonalbo, New South Wales, on August 30, 1925.

## Congress Notes.

THE AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION), SECOND SESSION, DUNEDIN, 1927.

THE EXECUTIVE COMMITTEE OF THE AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION) is progressing with the work of the arrangements for the sectional meetings. We learn that the majority of those nominated for the positions of presidents of sections of Congress have accepted office (see THE MEDICAL JOURNAL OF AUSTRALIA, July 25, 1925, pages 124-125). Sir John Macpherson, who was invited to become President of the Section of Neurology, has intimated that he will be unable to fill the position. The Executive Committee has therefore invited Dr. Oliver Latham to be the President of the Section.

### The Sections.

The various Section Committees have been appointed. The following is a list of Honorary Secretaries of the respective Sections:

Section I.—Medicine: Dr. C. S. Murray.

Section II.—Surgery: Dr. R. A. H. Fulton.

Section III.—Obstetrics and Gynecology: Dr. C. North.

Section IV.—Pathology and Bacteriology: Dr. A. M. Dreenam.

Section V.—Preventive Medicine: Dr. C. E. Hercus.

Section VI.—Ophthalmology: Dr. A. J. Hall.

Section VII.—Otology, Rhinology and Laryngology: Dr. W. E. Carswell.

Section VIII.—Neurology: Dr. S. A. Moore.

Section IX.—Diseases of Children: Dr. E. H. Williams.

Section X.—Naval and Military Medicine and Surgery: Dr. E. J. O'Neill.



Section XI.—Orthopedics: Dr. J. R. White.  
 Section XII.—Radiology: Dr. C. C. Anderson.  
 Museum: Dr. A. M. Dreenam.

All communications concerning the work of the Sections should at this stage be addressed to Professor W. P. Gowland, Honorary General Secretary of the Congress, Dunedin.

#### General Scheme of Work.

It is proposed as a general scheme that Congress concentrate on a limited number of problems of general interest and that the presentation of original work be encouraged. In each section it is proposed to set aside some part of each day for the consideration of the particular general subject selected for that day. A whole day has been allocated for original work unrelated to these subjects. It is recognized that the amount of time devoted to the general subjects will vary in these several sections and that some of the subjects will not lend themselves to profitable consideration in certain sections. Each section will probably wish to devote considerable time to its own particular problem. It is suggested, however, that in those sections in which it is found that the members can contribute profitably to the general subject, the work will be so arranged that it will fit in with the time devoted to the same subjects in the other sections.

Four full days will be available for the reading of papers and for the discussions, namely, Thursday, February 3; Friday, February 4; Monday, February 7 and Tuesday, February 8, 1927. On each of these days there will be both a morning and afternoon session. According to the tentative arrangements the subject of endocrinology with special reference to goitre will be dealt with on the first day. On the second day the special subjects will be diet and nutrition. Parasitology with special reference to hydatid disease and other tropical conditions and the blood diseases will occupy the attention of the sections on the third day. It is suggested that new work not related to the subjects mentioned above should be dealt with on the fourth day. As an example cancer research is mentioned.

### Post-Graduate Work.

#### TROPICAL MEDICINE AND HYGIENE.

A COURSE of lectures and practical instruction in tropical medicine will be held at the Australian Institute of Tropical Medicine, Townsville, commencing on October 1, 1925. The course will extend over a period of three months and will be followed by an examination. Instruction will be both theoretical and practical and will include tropical medicine, protozoology, helminthology, entomology, bacteriology and tropical hygiene.

The fee for the course of instruction will be ten guineas. Applications should be lodged before September 15, 1925, with the Director-General of Health, 51, Spring Street, Melbourne.

#### POST-GRADUATE COURSE IN MELBOURNE.

THE annual course of the Melbourne Post-Graduate Committee for post-graduate work will be held from November 9, to November 21, 1925, inclusive. Further information will be published in due course.

### Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xvi.

KYNUNA HOSPITAL, QUEENSLAND: Lady Doctor.  
 ROYAL AUSTRALIAN NAVY: Medical Officer.

STATE PUBLIC SERVICE, WESTERN AUSTRALIA: Assistant Medical Officer, Hospital for Insane.

### Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmalm United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchard United Oddfellow's Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND: Hon- orary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

### Diary for the Month.

- SEP. 15.—Tasmanian Branch, B.M.A.: Council.  
 SEP. 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
 SEP. 16.—Western Australian Branch, B.M.A.: Branch.  
 SEP. 16.—South Sydney Medical Association, New South Wales.  
 SEP. 22.—New South Wales Branch, B.M.A.: Medical Politics Committee: Organization and Science Committee.  
 SEP. 23.—Victorian Branch, B.M.A.: Council.  
 SEP. 23.—Western Medical Association, New South Wales.  
 SEP. 24.—New South Wales Branch, B.M.A.: Branch: Election of Two Members of Federal Committee.  
 SEP. 24.—South Australian Branch, B.M.A.: Branch.  
 SEP. 25.—Victorian Branch, B.M.A.: Annual Meeting.  
 SEP. 25.—Queensland Branch, B.M.A.: Council.  
 SEP. 25.—South-Eastern Medical Association, New South Wales.  
 SEP. 26.—Eastern District Medical Association, New South Wales.

### Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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